FORESTRY

VETERINARY MEDICINE

NOVEMBER 1946

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"G.I.'s" have sent thousands of dogs home from Europe. The dogs are transported on War Shipping Administration boats and the cost is approximately $75.00 per animal.

A wartime development was the use of waste at poultry packing plants for dog food. Dried viscera is approximately equal to casein in feeding value and is very palatable for dogs. It may be combined with other materials, up to 25%, in a complete dog food or used as a supplement to the ration.

In a test of delousing agents for clothing, by the Bureau of Entomology and Plant Quarantine, methyl bromide was found to be superior to all others tested. Used as a fumigant in a concentration of four pounds per 1000 cubic feet of space, it devitalized eggs of the body louse, *Pediculus Humanus Corporis* in 30 minutes, when the clothing to which the eggs were attached was in the middle of a filled barracks bag.

The Office of Technical Services of the U. S. Department of Commerce has for distribution a report of a staff surgeon of the German air force which details experiments in which guinea pigs were killed by reducing the body temperature to 16° C. (61° F.) by immersing the animals in ice water. Up to 15 minutes after the heart had stopped beating and respiration had ceased the cavies could be revived by raising the body temperature to normal and electrically exciting the heart. Rabbits could not be revived under similar conditions. The report is listed PB-16787. Photostat copies (20 pages) $2.00; microfilm 50 cents.

Streptomycin is at least one hundred times as effective in protecting mice from influenzal meningitis as sulfadiazine and serum—the standard treatment for the condition in persons.

A hyperimmune human serum for the prevention and treatment of whooping cough in children has been prepared by Harriet M. Felton, M.D., Philadelphia. Of 308 children exposed to whooping cough and given the serum, 78% failed to contract the disease. Used in the treatment of the disease it lowered the expected mortality.

One hundred million pounds of chicken feathers and 30 million pounds of turkey feathers go to waste, in this country, annually. This waste contains nearly 40 million pounds of barbs suitable for weaving in to a fabric for garments. Feather fabric which is still in the laboratory stage of development resembles wool but is warmer, softer, lighter, can by dyed any color, possesses a brilliant luster and can be washed with no more shrinkage than cotton—*Poultry Digest.*

Ernest W. Goodpasture, professor of pathology and dean of the School of Medicine, Vanderbilt University, Nashville, Tennessee, received the 1946 Passano Foundation Award for development of the method of propagating viruses by inoculation of chick embryos and for contributions to the advancement of the knowledge of cell-parasite relationship in bacterial and virus infection. The Passano Foundation was established by Williams and Wilkins, medical publishers. The cash award is $5000.

Unless rabies is conquered, the dog field will suffer basically in lessened sales, lessened dog ownership and increased propaganda against all dogs.—*Dog World.*

Epizootic of Trypanosomiasis

Alarm is expressed in South Africa over the spread of nagana in Zululand. During the past three months more than 15,000 cattle are reported to have died of this trypanosomiasis. Control measures are being directed as for the past 25 years, against the tsetse fly. Some time ago, the veterinary authorities undertook the plan of killing the large game animals in the area—the natural host of both the tsetse fly and the *Trypanosoma brucei*—and carried it out with great thoroughness, but without avail in control of either the fly or the trypanosome. Recently some success has been attained in the experimental dusting of large areas with D.D.T.

Effects of Extreme Cold Studied by Surgeon General's Office

Extreme or prolonged cold tends to clot red blood cells so that they plug the circulation. This eventually results in development of gangrene and loss of frozen limbs or other parts. This has been established both by careful study of pathological tissue from overseas soldiers and experiments with rabbits in which limbs were subjected to temperatures of minus 30° centigrade.

The condition became of great importance in the European Theater during the late war. It was most dramatically exemplified among air crews subjected to the extreme temperatures four or five miles over the clouds. Even an exposure of one minute might result in the loss of a finger.

It was one of the chief causes of casualties in the Apennines campaign of the winter of 1943-44. Infantrymen sometimes stayed days at a time in fox-holes filled with slush and ice-cold water. When they were relieved they would be unable to walk and were in almost unbearable pain which often persisted for weeks, and the loss of toes was not infrequent.

The condition was one in which there had been little previous experience and its pathology was not understood.

The same condition can be produced in the rabbit limbs by immersing them for one-half hour in alcohol at minus 30° centigrade. This was a far more severe exposure than a soldier ever would be likely to encounter.

The clotting can be prevented in the rabbits, however, by injections of heparin. Treated rabbits seemed little the worse off when their legs were thawed.

The composition of grains is quite uniform but the composition and feeding value of hays are determined by the stage at which they are harvested, the weather and the method of handling.

Fleas taken from kittens which were associated with typhus fever patients were found by the Texas Health Department to be harboring typhus fever germs. It has been known for many years that fleas from rats are spreaders of typhus fever.

Canada Restricts Importation of Dogs

Dominion Ministerial Order No. 60, prohibits the importation of dogs from the continents of Europe, Asia and Africa except through the Animals Quarantine Stations in which they must be held for a period of six-months at the expense of the owner. Dogs originating in Great Britain, Northern Ireland and the Irish Free State are excepted and if shipped direct to Canada may enter without restriction.

On the theory that offense is the most effective defense, Michigan veterinarians have joined with physicians in a plan to have introduced, at the next session of its state legislature, a bill to authorize animal experimentation as a counter to a bill antivivisectionists will introduce to prohibit such research. The committee entrusted with the work of drafting an acceptable measure consists of Dr. Don Cummings, Michigan State Health Department, Dean Ward Giltner, Division of Veterinary Medicine, Michigan State College and Wm. J. Burns, executive secretary of the Michigan State Medical Society.

Chemotherapy

In a report on the use of p-arsenosophenylbutyric acid, a phenyl arsenoxide, Eagle of the U. S. Public Health Service, lists a high percentage of cures of trypanosomiasis including infections with *Trypanosoma gambiense, T. rhodesiense* and *T. equiperdum.* The present report (*U. S. Pub. Hlth. Repts.* 61:28, 1466) deals almost exclusively with the use of this active trypanocidal agent in the treatment of sleeping sickness in man, but a later report on its use in the treatment of trypanosomiasis in animals is indicated.

The author concludes that early infections in man may be definitely cured within a week by six or seven daily intravenous or intramuscular injections of 1mg per kilogram of body weight, and states that the chemical is equally effective in animals.

Poultry and egg income set a new record in this country in 1945—$2,764,974,000. Chicken prices averaged 25.9 cents per pound live weight and egg prices averaged 37.5 cents per dozen. These prices have been exceeded only in 1919 and 1920.

Pneumoencephalitis Diagnosed in Fifteen States

Pneumoencephalitis of chickens (Newcastle disease) has been diagnosed clinically and the diagnosis confirmed by means of virus isolations or virus neutralization in 15 states—California, Connecticut, Delaware, Illinois, Maryland, Massachusetts, Michigan, Minnesota, New Jersey, New York, Pennsylvania, Rhode Island, Utah, Washington and Wisconsin. Clinical diagnoses have been made in at least six additional states.

In order to prevent outbreaks of infectious bronchitis among laying pullets, the Massachusetts Agricultural Experiment Station, the Massachusetts Department of Agriculture and the Massachusetts Agricultural Experiment Station have cooperated for over five years in a program which consisted of inoculation of young birds, preferably 12 to 14 weeks of age with the virus of infectious bronchitis. When the birds are in good condition the reaction is not harmful, the flocks recovering from the disease from 10 to 21 days after inoculation. The results have been satisfactory as the birds developed an immunity before coming in to egg production and there has been a reduction in loss from infectious bronchitis.

The Science Which Improves the Food Supply

With almost a billion dollars' worth of livestock and poultry on the farms of Illinois, the importance of the service rendered by our practitioners of veterinary medicine cannot be overestimated. Indeed, throughout the long history of the state our veterinarians have made a splendid contribution to the wealth of our farms and the prosperity of our farmers. Perhaps the decline of the horse as a means of transportation has left our urban population less conscious of their dependence upon your knowledge and your skill. But certainly the meat shortages of this war have given us all a new sense of obligation to the science which protects and improves the meat supply of our nation.—From address by Governor Dwight H. Green at the 64th annual meeting of the Illinois Veterinary Medical Association, Springfield, Jan. 17-18, 1946.

The quality of roughage is more important than the kind. A poor quality of alfalfa or clover may contain less protein and other essential ingredients than good timothy or brome grass hay.

Feeding tests at the Iowa Agricultural Experiment Station led to the conclusion that oats are the best single grain for poultry. Poultry nutritionists studying feed deficiencies have found that oats have such good qualities that it is difficult to produce any deficiencies when oats are included in the ration.—*Everybodys Poultry Magazine.*

Corn Tassels for Poultry

It has been found by the Northern Regional Research Laboratory in Illinois that tassels taken just before the pollen begins to shed contains 12 times the vitamin A, eight times the vitamin B_2, twice the vitamin B_1 and three times the niacin and pantothenic acid potency of corn kernels. The protein level of tassels is almost twice that of corn.

An acre of corn planted for hybrid seed production is estimated to yield about 270 pounds of dry tassels. Thousands of tons of feed material could be saved each year if tassels were collected when removed.

The Course of Coccidiosis

By deliberate infection in hundreds of experiments, Dr. W. E. Swales, Macdonald College, Quebec, observed that the course of coccidiosis in chickens is as follows:

5-Day Development Period

Monday morning—Birds given infective dose of coccidia (cecal type).

Tuesday—Birds appear normal. Feed consumption normal.

Wednesday—Birds appear normal. Feed consumption normal.

Thursday—Frothy droppings and traces of blood in droppings. Feed normal.

Friday—Birds still appear normal. Feed normal. Bleeding definite.

3-Day Sick Period

Saturday—Dumpy birds. Profuse bleeding. Feed consumption drops lower. By afternoon start to die.

Sunday—Majority of deaths on this day.

Monday—Still sick.

Recovery

Tuesday—Recovery begins. Feed consumption picks up.

Wednesday—Survivors well on road to recovery.—*Poultry Digest.*

Thoughts Through the Centuries*

In the second century the breath as well as the bite of the mad dog was thought to be dangerous.

It is easier to manipulate bacteria in a controlled environment than to coax a living cell out of an animal body.

We still have to reckon with the simple irreducible fact that people, like mice, are different immunologically, and we do not know how or why they are different.

In its simplest aspect immunization consists of giving the body dead bacteria to practice on so that it forms habits of resistance which subsequently check the invasion of living bacteria of the same sort.

North Carolinians were warned (1918) by their board of health that it was futile to wear "sulphur in their shoes, asafetida in their bosoms, cucumbers on their ankles or potatoes in their pockets"—for the "mysterious malady"—influenza.

Theobald Smith's discovery, in 1893, that ticks spread Texas fever among cattle paved the way for significant work on other non-flying insect vectors. [The only thing wrong with this observation is that Kilborne and not Smith made the discovery.]

Virus has been for hundreds of years a convenient generic name for disease-stuff. Today we think of viruses as particulate entities of very small but determinable size, incapable of development or multiplication outside living cells, and causing either overstimulation or death (or both) of the cells in which they lodge.

In the last two generations we have got a working knowledge of bacteria and viruses and their means of travel . . . that has sifted down to plain men and women in the form of a blurred but genuine awareness of the nature of infection and some defenses against it.

---

*Excerpts from *Plague on Us*, by *Geddes Smith*. Published by The Commonwealth Fund, New York. Price $3.00.

★ ★ ★ ★

★ ★ BUY U. S. SAVINGS BONDS ★ ★
AND HOLD THEM

The rickettsiae (typhus and related organisms) look like very small bacteria, but unlike bacteria, they are at home only within the cells of the host.

The disease-producing protozoa, bacteria and rickettsiae have one thing clearly in common: their place in the biological scheme of things is to live the parasitic life, which according to the definition quoted by Theobald Smith is "the finding of lodgement and food by one organism on or in another." Man is inevitably a boarding-house: he sickens when he entertains the wrong guests.

With all the educational effort that has been made to teach the danger to human health that the plague-carrying, fever-carrying, flea-infested rat constitutes and the pest's economic cost in human and animal food eaten and destroyed, we still find residences constructed to afford equal comfort to man and rats; corn cribs built for both corn and rodents, and barns designed alike for livestock and vermin, with feeding facilities for both.

"Never stop to think we belong to a 200 million dollar industry, Harry? . . . That's the amount of yearly damage they say we do."—*Everybody's Poultry Magazine*

The rat is not the only hanger-on that has repaid human hospitality by sharing its diseases with man. Domestic animals—the goat, cow, and hog—maintain the reservoir of infection in undulant fever. Tuberculosis may come from cows, rabies from dogs, anthrax from several domestic animals, psittacosis from parrots, tularemia from rabbits, Rock Mountain spotted fever through ticks from wild animals and, encephalitis probably through fleas to birds and animals and back from fleas to man.

The Chief of the B.A.I. admonishes Bureau veterinarians not to vaccinate reactors to the brucellosis test on the grounds that such practice is a very unethical procedure; Bureau investigations having shown, in the opinion of research workers in the Bureau, that such vaccination is of no value.

* * * *

Since the dairy cow gets about two-thirds of her nutrients from roughage during the barn feeding period and a greater portion on good pasture feeding, the grain fed must be considered as a supplement to make up the difference in the nutrients required by the individual cow. Green, early cut hay with most of the leaves remaining is not only high in protein, but it is generally consumed with less waste and the hay in this condition is high in the vitamins and minerals normal to the crop.—W. H. Fitch, Chief, Division of Dairy Husbandry, University of Minnesota.

* * * *

Preparation of Crystal-Violet-Glycerol Hog Cholera Vaccine

A. *Materials.*—1. Defibrinated virulent virus blood, freshly drawn with aseptic precautions from pigs sick with acute, uncomplicated hog cholera induced by the injection of virulent virus. This blood should be drawn from the pigs from the sixth to the eighth day, inclusive, after injection of the virus. The blood is chilled immediately after drawing by immersing the container in cracked ice.

2. Crystal violet, extra pure, to contain at least 85% dye.

3. Glycerol, C. P.

B. *Methods.*—1. Preparation of dye solution: One gram of the crystal violet is dissolved in 400cc of the glycerol with the aid of heat.

2. Preparation of the vaccine mixture: With aseptic precautions 200cc of the glycerol-dye solution is added to 800cc of defibrinated blood virus.

3. Attenuation: The vaccine mixture is held at a temperature of 37.5° C. for 14 days, being agitated sufficiently to distribute the sediment uniformly at least once each day. At the expiration of this period the vaccine is then ready for use and the containers are placed in cold storage.

In the formula for crystal-violet-glycerol vaccine given in the May issue of VETERINARY MEDICINE (page 161) the proportion of glycerol differed from the above, which is the formula now followed by licensed manufacturers. It is suggested that readers place a reference to this page alongside the formula in the May issue.

A machine for harvesting sweet-potato vines, developed by the USDA makes possible the addition of thousands of tons of high quality hay or silage in districts where these tubers are grown commercially.

* * * *

The average productive life of cows in dairy herd improvement associations is approximately 4½ years. The U. S. Department of Agriculture states that this productive period might well be doubled by better care including feeding. As it takes two years for a cow to pay for her raising, this longer productive period would extend her profitable period nearly 300%.

* * * *

Swine Require Salt

Two groups of swine, each comprising 14 animals as nearly identical in age, size, weight and condition as selection could make them, were fed identical rations at the Purdue Agricultural Experiment Station, except that one group received no salt while the other received salt free choice.

Gains in the group fed no salt cost $12.53 for feed per 100 pounds. In the other group the cost of feed per 100 pounds gain was $8.68 plus approximately one cent for salt, a net saving of $3.83 per 100 pounds gain from the addition of salt to the ration.

* * * *

Kansas City Stockyards Using DDT Cattle Spray

A cattle spraying service is now available at the Kansas City, Kans., stockyards, which, if fully utilized and followed up with spraying on the farm, can mean the addition of many thousands of pounds of beef gains on cattle, it is claimed.

In the spring and summer months, a DDT spray for the control of flies and lice, which annoy cattle and tend to hold down weight gains, will be available to farmers before the cattle leave the yards. The permanent spray equipment recently installed at the yards includes five high pressure sprayers, each equipped with a 400-gallon storage tank. Spray pipes have been installed both above and below the pen so that all parts of the animal receive the treatment. In the fall, derris powder will be added in order to eliminate grubs and lice.

This is the first time such complete spraying service had been furnished at any public market. The packer and stockyard administration of the Department of Agriculture has approved a service charge of 15c per head, with a maximum of $6 per carload for spraying cattle.—*Nat'l Provisioner.*

Veterinary Corps Officers Separated from the Service Since VE-Day

(Supplement to lists previously published)

Alabama

Dorrough, Bill

Arkansas

Eagle, Thomas M.

California

Cooper, Emanuel S.
Crundwell, Joseph B.
Groves, Newell P.
Handel, Robert T.
Hylton, Jack W.
Lunt, Donald W.
Milbradt, Duane L.
Romo, Ralph R.
Talcott, Robert V.
Tietze, A. L. Jr.

Colorado

Morris, James V.
Short, George E.
Snodderly, Wm. J.
Watts, Raymond E.

Connecticut

Burr, Orville L.
Gorman, Richard J.

Delaware

Nusser, William A.

District of Columbia

Keeler, John Rodman

Florida

Wassenaar, Peter M.

Idaho

Hoon, Henry R.
Weil, Frederick

Illinois

Bark, Hurdman W.
Faulkner, Harold W.

Indiana

Blume, Ervin V.
Fireoved, DeLoss W.
Oldham, William R.
Stout, Robert W.

Iowa

Brager, Richard C.
Eittreim, Silas C.
Fistler, Raymond P.
Karbert, Melvin W.
McIntire, John C.
Stephan, Carl F.
Venzke, Carl E.
Wolfe, James W.

Kansas

Atkinson, George W.
Beckenhauer, Neil D.
Hentzler, Robert W.
Ogilvie, Fred B.
Stoddard, Edward D.
Upham, Roy Walter
Wilson, Mark F.

Maryland

Armstrong, Herbert L.
Dibbell, Chas. B.
Hickman, Geo. R. Jr.
Willis, Thomas E.

Massachusetts

Blake, John E.
Gates, Silas B.
Wilcox, William A.

Michigan

Mercer, Robert L.
Moore, Donald Lee

Minnesota

Meyers, Howard
West, Ralph L.

Mississippi

Bradshaw, Nathan D.

Missouri

Anderes, Robert L.
Barnhart, Walter G.
Mash, Noah
Mowder, Wilbur H.
Renfrow, Charles D.

Nebraska

Hubbard, Henry E.
McGill, Dana T.
Reppert, Roy E.

New Hampshire

Swail, Clark E. Jr.

New Jersey

Greene, James G.
Hitchner, Stephen B.
Stockton, A. E. Jr.

New York

Adolph, W. H. Jr.
Cain, Harold D.
Doig, Robert S.
Droleskey, Ed. A.
Feldman, Murray
Gilmour, Judd T.
Guthrie, Richard S.
Halpin, George D.
Hantman, Harris W.
Kiesel, George K.
McKown, Donald C.
Majilton, Edward A.
Martin, Kenneth H.
Matuszczak, W. J.
Michaels, Albert M.
Primerano, Walter D.
Rosen, Bernard Wm.
Tax, Herman
Thompson, William B
Wuori, Leo Adolph
Zimmerman, Theodore

Ohio

Bailey, Robert M.
Bridenstine, W. A.
Gardner, Paul O.
Hawley, Dan W.
Kilburn, Friend L.
Lyday, Charles V.
Mainwaring, G. T.
Meisinger, Fred H.
Mills, John W.
Moats, Arthur E.
Montgomery, Chas. W
Rhinebarger, Roy R.
Ripley, Richard A.
Smith, Robert C.
Strong, Warren M.
Vaupel, Carl F.
Weight, Thomas H.

Oklahoma

Bowerman, W. D.
Lee, Robert J.
Stephens, Seidel M.

Oregon

Glaisyer, Roland A.
Rosenwald, Arnold S.

Pennsylvania

Campbell, Joseph C.
Erickson, John E.
Gorelick, Arthur N.
Knipe, Hesser
Kutsher, Lincoln G.
Mickle, Ross T.
Pease, Clinton L.
Rosenberger, Geo. G.
Simington, Joseph O.

South Carolina

Beaty, Robert W. Jr.

Tennessee

McGlohon, John M.
Morgan, Harry H.

Texas

Grissam, Garner J.
Grove, Samuel E.
Mostyn, Henry B.
Redmond, Harold E.

Utah

Tugaw, Edward A.

Vermont

Wakefield, Wendell S.
Wilson, Amos P.

Virginia

Waple, Marshall J. Jr.

Washington

Anderson, Olin A.
Hales, Marvin R.
Howder, John Wm.
Meyer, Leo Joseph

Wisconsin

Askerman, Leon F.
Candlin, Paul T.
Downey, Keith W.
Hergren, Douglas R.
Leary, James D.
Nehmer, Eugene O.
Welch, James L.

Wyoming

Redman, Ward D.

Canada

Burley, Douglas R.

Award of the Legion of Merit

A LEGION OF MERIT for exceptionally meritorious conduct in the performance of outstanding service during the period 6 May 1945 to 30 April 1946 was awarded to COL. ELMER W. YOUNG, Veterinary Corps, Army of the United States, by command of Lieut. Gen. Gillem.

83rd Annual Meeting of the A.V.M.A.

(Continued from October Issue, Page 339)

Cattle Practice

A discussion of the genesis of mastitis, by James M. Murphy, Sussex, N. J., appeared to invalidate several theories heretofore held as to the reason for the increasing prevalence of mastitis in dairy cows with the advancing age of the animals.

His observations dealt with two herds—one Guernsey and the other Holstein—of approximately 60 cows each which were maintained separately upon the same farm under almost identical circumstances and studied over a seven-year period. The herds were maintained almost exclusively by heifer calves raised on the premises and introduced into the milking herd at their first lactation as replacements for cows removed for the usual reasons.

The incidence of streptococcic mastitis, 90% of which was due to *Str. agalactiae*, was 37.6% in the Guernsey and 19.6% in the Holstein herd. The spread of the disease was slow and apparently bore no relation to herd management or practices, but was determined only by the age of the cows.

Although, as stated, the management, herd practices and environmental factors were as nearly identical as they could be made, the rise and fall of infection in the two herds did not coincide but in each herd was tied to the average age of the cows.

Infection in herd replacements adhered to the same pattern; beginning at 16% in the second lactation and increasing uniformly to 66% in cows aged nine years. Since the age relationship is a straight-line relationship rather than a curved-line relationship the author reasons that the increasing prevalence of infection is due to a function of age (change within the body) rather than age *per se* (passing of time affording more opportunities for infection).

"Six predisposing factor theories advanced by various investigators in explanation of the increasing-with-age incidence of natural streptococcic infection and the irregularities attending attempts to establish such infection by artificial means, were discussed. Two of these theories, 'teat patency' and 'obvious injury of the teat,' have been relieved of further major consideration by information previously presented; two theories, 'degree of exposure' and 'prior sensitization' (insofar as it is related to 'degree of exposure'), are rendered untenable by the observation that the age factor is a function of age; and one theory, 'nonspecific mastitis,' is noted to have been refuted by the later observations of its authors.

"The remaining theory, the 'hormone' theory of Francis, which introduced the thought that some change might occur within the mammary gland with the passing of time as an effect of the part played by hormones in the growth and function of the gland that would make it more susceptible to streptococcic infection, now stands as the only theory as to a predisposing factor that can be considered valid."

Raising heifer calves on mastitis milk, a discussion of S. D. Johnson, Ithaca, N. Y., gave a record of two experiments in raising calves on milk from infected udders. Surveys in herds badly infected with mastitis have revealed first calf heifers with "blind" quarters and badly damaged udders. Many have speculated that such pre-lactation infection is acquired by calves as a result of nursing one another after feeding on milk which was heavily contaminated with mastitis organisms.

In one experiment day-old heifer calves were penned separately and fed on milk from diseased udders infected with staphylococci and streptococci of various types. In the second experiment day-old heifer calves were penned two or more together and fed milk from the same source as the other group. This second group was permitted to nurse one another habitually.

When 12 heifers in the first-experiment (penned separately) calved, six gave milk containing flakes, clots or pus, or that was watery. These abnormalities disappeared in one to three milkings. *Str. uberis* was found in the milk of two quarters after freshening but disappeared on the second day. Five heifers calved shedding large numbers of hemolytic staphylococci, in the milk of 12 quarters, which persisted but apparently did not cause mastitis.

Six heifers have calved in the second experiment (penned in pairs or larger groups). Flakes were present in the milk of three quarters for the first two or three milkings. *Str. agalactiae* were found in the milk of one quarter on one day only. Cultural examinations from all other quarters were negative.

The author concludes that none of the udders were damaged sufficiently to disqualify the cows for milk production.

Milk fever was discussed by A. H. Craige, Jr., Towanda, and I. V. Stoll, Rome, Pa. They

hold that milk fever is, fundamentally, an alkalosis and the hypocalcemia is a secondary phenomenon, due to the alkalosis and the excretion of calcium in the colostrum.

They also suspect that acetonemia is another manifestation of post partum alkalosis resulting from a physiologic attempt to counteract the excessive alkalinity by elaboration of metabolic acids.

The authors related their experience in supplementing the usual milk fever treatment with chlor-ethamin, a potent acidifier, administered orally when the animal can swallow.

Of 12 cases of milk fever treated by the intravenous injection of calcium gluconate, six relapsed and required a second injection. Of 10 similar cases treated with the same dosage of calcium gluconate and supplemented with chlor-ethamin only one showed any symptoms of recrudescence.

The procedure followed was, injection of the customary dose of calcium gluconate in the prostrate cow and when she had recovered sufficiently for oral dosing she was drenched with 40 to 60gm of chlor-ethamin dissolved in a quart of water.

A paper on muscular dystrophy (white muscle disease) in young calves, by L. R. Vawter, Reno, Nev., stated that this little understood disease has been encountered recently in semi-range herds in Western Nevada. It occurred in calves from 10 days to two months of age.

The peracute type of the disease appears suddenly accompanied by dullness, respiratory distress, blood tinged nasal discharge and death in six to 12 hours. The dystrophic lesions are mainly of the left cardiac ventricle and septum, passive pulmonary edema and hydrothorax.

The subacute type of muscular dystrophy is characterized by muscular stiffness, inappetence and prostration after about a week. The lesions include symmetrical dystrophic degeneration of muscles of the legs, neck and tongue.

The disease occurred only in herds where the cows subsisted on inferior hay during the latter one-half of the gestation period and for several weeks after calving. Calf losses ceased a week to 10 days after the cows were placed on green pastures.

Although the dystrophic changes closely resemble those associated with vitamin E deficiency in other species of animals "in the absence of experimental evidence, it is presumptuous to conclude that this malady is entirely a manifestation of vitamin E deficiency."

Vaccination studies on bovine trichomoniasis by B. B. Morgan, Madison, Wisc.: Nine of ten heifers were temporarily protected from trichomoniasis by 16 injections, intramuscularly or intravenously, with living organisms over a period of two months. The heifers conceived from artificial insemination, and produced normal calves notwithstanding the injection of 10cc of motile trichonomads into each horn 24 hours after insemination. All control animals became infected.

Fewer injections over a shorter period afforded less protection; the protection being proportionate to the number of injections.

Vibrionic abortion in cattle, by W. N. Plastridge, Storrs, Conn.: Of 188 blood samples from aborting cows in brucellosis-free herds, 49% were negative, 12% suspect and 39% positive to the agglutination test for *Vibrio fetus* infection. The abortion rate in *V. fetus* infected herds varied from 4% to 20%, with an average of 12%. Of 26 cows that became positive to the test during the latter one-half of the gestation period 42% aborted; of 38 that were positive but became negative by the fourth month of gestation 3% aborted, and of 72 that were positive throughout gestation 7% aborted. Of eight cows that became negative following abortion, two were sterile and six calved normally. Of four cows that remained positive following abortion, one was sterile, two aborted again and one calved normally.

The relation of the opsonic index to infection and immunity in bovine brucellosis, by W. Ralph LeGrow, Ithaca, N. Y.: Monthly agglutination tests and opsonic index readings were made on a large number of animals over a two-year period. The examinations of the serum and whole blood of these animals have shown—

1. The blood of infected cows shows a high opsonic index.

2. The blood of cows kept for years under exposure, without contracting brucellosis, quite often may show a low opsonic index.

3. The agglutination titer and the opsonic index of calves become high shortly after vaccination, but whereas the titer in most instances recedes over a period of eight to 12 months, the index remains high for a considerably longer period, probably during the period of immunity conferred by the vaccination.

4. Animals with a negative agglutination titer and a high opsonic index would appear to possess a high degree of immunity to *Brucella abortus*.

The animals in this study included:

1. Chronic reactors having had a high blood titer for years and with known elimination of Brucella in their milk or uterine discharges.

2. Animals with a fluctuating blood titer, but no history of spreading the organisms.

3. Animals with a negative blood titer which had been subjected to heavy exposure for a considerable time.

4. Animals which were vaccinated as calves, kept in negative herds for several years and then subjected to heavy exposure.

5. Calves with prevaccination and postvaccination observation.

Advantages of vaccination against bovine brucellosis by L. A. Dykstra, Aurora, Ill.

In infected herds:

1. Calf vaccination provides practical protection for heifer replacements.

2. Vaccination of negative, open, adult animals affords at least some protection against abortion.

3. Vaccination of mature, positive reactors is difficult to evaluate, but there is little to be lost and it may be of some value.

In noninfected herds:

1. Calf vaccination provides the best known means of establishing a relative immunity against subsequent exposure from outside the herd.

2. Few brucellosis-free herds are so completely isolated that exposure at some time does not occur. A herd that has been vaccinated as calves usually shows greater resistance to infection under these circumstances than one that has not been vaccinated.

3. If all heifer calves were vaccinated on an area basis the resistance of the cattle population to brucellosis would be greatly increased, thereby minimizing costly outbreaks.

4. Vaccination has been the only means of salvaging many herds where the owner could not bear the economic burden of a test and slaughter program.

Limitations of vaccination against bovine brucellosis by R. R. Birch, Ithaca, N. Y.

Calf vaccination:

"1. It sometimes produces permanent reactors that cannot be distinguished from natural cases of brucellosis. This is a distinct loss in purebred herds especially.

"2. It does not always produce lasting immunity. Animals vaccinated as calves and exposed several years later frequently acquire brucella infection. Sometimes this occurs in a mild form in which no outward symptoms occur, but elimination of Brucella organisms takes place and sometimes actual abortions occur. In each case blood reactors are created by the exposure.

"3. Calf vaccination in clean herd may possibly spread Brucella infection to adults in the herd. We know that this does not usually take place and it is frequently stated, without sufficient evidence, that no cases of spread to the adults due to calf vaccination have occurred. The real fact is that Strain 19, used in making the vaccine, is a milk pathogen and no extensive examinations have ever been made to determine whether outbreaks in adults following vaccination of calves in the same herd are caused by Strain 19 or field strains.

"4. Calf vaccination, because it tends to submerge the symptoms of brucellosis, frequently is substituted for all other methods of control looking toward the establishment of clean herd. This gives temporary relief in the individual herd but whenever vaccination causes blood testing to cease, it postpones the day when an advance against the disease on a broad and secure basis can be made."

Adult vaccination:

"1. It tends strongly to create permanent reactors that cannot be distinguished from natural reactors.

"2. It cannot be depended on to check the spread of brucellosis in a herd, though it may do so sometimes.

"3. It causes some abortions when administered to cows in advanced pregnancy.

"4. It postpones for a long period the time when the herd can be freed from brucellosis through the use of the agglutination test.

"5. It creates a serious sanitary problem where milk from the herd is not pasteurized.

"6. Used widely, and indiscriminately (as it actually is used), it leads away from the establishment and maintenance of clean herds."

Cattle scabies in the Northeastern States, by Donald W. Baker, Ithaca, N. Y.:

The volume of complaints from farmers and others has suggested that there is an increased incidence of cattle mange in New York State.

"The economic loss resulting from injuries to the udders, dermatitis, debility and a significant decreased milk production, is considerable. Human contact infections of bovine sarcoptic mange were reported frequently this past winter and represented a serious farm labor problem.

"Although sarcoptic mange was found to be the most common, serious, widespread, and difficult to control of the parasitic dermatidites of cattle, our survey uncovered outbreaks of chorioptic scabies, psoroptic scabies, demodectic mange, ringworm, stephanofilari-

asis and lousiness, as parasitisms present in New York State cattle in 1945-1946. A differential diagnosis based on the demonstration of the specific pathogen should be made before the control program is started.

"Sarcoptic mange and all of the other diseases listed above are usually referred to as 'barn itch' by the farmer.

"Sarcoptic mange is a winter disease with the most serious losses reported during January, February and March, although some outbreaks occur in December and April. Developing cases and sometimes old chronic cases in cows sold through the community auction sales represent the most common method of spreading the disease on both the regional and statewide basis. The custom of placing a newly acquired milking cow in any convenient stanchion on the milking line facilitates the spread of mange throughout a susceptible herd. It is unusual to encounter a dairy farmer who has any appreciation of the importance of providing any sort of quarantine barrier which might be used to protect his established herd from diseases brought in by purchased additions.

"The repeated dipping of mange and scabies infected cattle in hot lime and sulfur solution is not practical or possible at the present time in New York State. Treatment must be instituted in the cold winter weather and for isolated groups which may number from a half dozen to several hundred animals. The hand treatment, using a small sprayer and brush, is very laborious and disagreeable and the lack of sufficient labor usually causes the discouraged farmer to discontinue treatment before the infection has been eradicated.

"One control method which has been encouraged and which is becoming popular in a few regions is for the farmer to contract with a local licensed barn sprayer who is equipped with a high pressure pump sprayer rig to spray the infected herd with hot lime and sulfur solution at eight or nine day intervals for a minimum of six treatments."

Telangiectasis and abscesses in the livers of beef cattle was the subject of a research report by Rue Jensen and Paul R. Frey, Ft. Collins, Colo. The economic loss from the condemnation of beef livers at abattoirs having federal meat inspection is large and has engaged the attention of meat packers and research institutions for years. The condition is far more prevalent among the cattle in the intermountain area than elsewhere. Two experiments were undertaken by the Colorado experiment station to determine (1) the time that liver abscesses develop (on the range or in the feeding pens) and (2) the relationship, if any, of liver abscess to hepatic angioma (telangiectasia) and depletion of the hepatic reserves of vitamin A.

The conclusion reached by this research is that abscesses develop both on the range and in the feed lots; hepatic angiomas precede the abscesses and depletion of vitamin A reserves is rapid and continuous in the feed lot. The suggestion is made that telangiectasia and vitamin A depletion both predispose liver tissue to abscess formation. Both conditions commonly preceded the formation of abscesses in the livers of fattening cattle.

No compliment was paid to hearers of this excellent report of excellent research by the frequent use of "sawdust" to explain what the writers meant by telangiectasis.

Rumenotomy in the dairy cow, by E. C. Moore, Lewiston, Me.:

"Indications. Impaction, foreign bodies.

"Equipment. Procaine hydrochloride, syringe, four-inch needle, several hemostats, scalpels, No. 4 chromic catgut, several half circle needles, a rubber sheet three feet square with six-inch embroidery hoop in center. Also, long sleeved rubber gloves and a pair of regular rubber gloves.

"Technique of Operation. Place the animal in standing position in clean place; thoroughly shave and disinfect area ten inches wide, extending from the transverse processes of the lumbar vertebrae two-thirds of the way down the flank on the left side, and cover with a sterile shroud. Inject from 10 to 20cc of procaine hydrochloride epidurally, and infiltrate the operative area thoroughly with the same anesthetic, going deep into the muscles in the area. Make a vertical incision in the skin and muscles ten inches long starting just below the lumbar processes. Place four stay sutures in the rumen about two inches apart at the two commissures of the laparotomy incision. Retract the rumen through the laparotomy incision and make a vertical incision a little over six inches long in it. If the contents of the rumen are very gassy, suture the rumen to the edges of the laparotomy incision before making the incision in the rumen. This is to prevent any of the contents from getting into the abdominal cavity. Now place the rubber sheet into the rumen being sure it is well inside the rumen. After removing what material you wish from the rumen, remove the sheet. Clean the edges of the rumen and the laparotomy incision thoroughly. Remove the long sleeved gloves, and put on the regular gloves. Suture the rumen with two continuous rows of Lembert sutures using No. 4 chromic catgut, bury-

ing the first row with the second. Remove the stay sutures. Suture the peritoneum with a continuous suture of the same catgut. Suture the layers of muscle, using a separate row of sutures for each layer, keeping the stitches close together and using the fascia rather than the muscle tissue for attachments. Suture the skin with interrupted sutures of umbilical tape, having plenty of retention sutures to avoid cutting. Apply a dressing of flexible collodion to prevent contamination. Keep a close check on patient to be sure the rumen is working properly to avoid adhesions. Remove the skin sutures in 10 days or two weeks. Feed lightly for one week after the operation."

Surgery of the udder and teats, by F. A. Hall, Garrett, Ind.:

"Surgery and Care of Wounds Involving the Sphincter. For naturally hard milkers and strictures due to injuries, the sphincter is cut sufficiently to allow a free flow of milk. Operate aseptically and with the least amount of trauma possible. Should involve only the muscle and not external. If there is infection at the end of the teat and the sphincter is swollen, do not operate. Apply 10 per cent sulfathiazole ointment. Discontinue milking the quarter until swelling is reduced. After the infection is gone, then cut the sphincter if necessary.

"Wounds to the Teat Which Involve the Milk Duct. Should be taken care of promptly. Apply antiseptic to area around the wound and none on the wound itself. Suture with fine, worm gut, and a small needle. Use a figure 8 stitch. Keep wound dry, cover with collodion.

"Acquired Teat Fistula. Operate when cow is dry. Use a very sharp, small blade. Remove the fistula with an elliptical incision. Suture as above.

"Tumors or Growths of the Teat Canal. Remove them by way of the side of the teat if possible, and suture as above.

"Obstructions Due to Membrane or 'Spider.' Use a general clamp or rollers to capture a small amount of milk in the milk cistern. With the pressure applied with fingers or hands, rupture the membrane. Do not roll to make the pressure.

Amputation of the Udder. Use general anesthesia. Dissect on the median line between halves of udder, and around to the pubic vessels. Ligate and sever. Continue around the gland and downward to the teats. Ligate milk veins at the belly. Repeat around the other half to remove the entire udder. Apply sulfanilamide powder and suture tightly."

Avian Pneumoencephalitis (Newcastle Disease)

Much of the discussion in the poultry section concerned the recent (?) outbreak of avian pneumoencephalitis. Without attempting to abstract the separate papers on the subject the story is briefly somewhat as follows:

Since 1935, a respiratory disease of chickens, differing from "colds," roup and infectious laryngotracheitis, has been recognized in California and known to poultry men as "chicken flu" or "nine-day pneumonia." It may have occurred earlier than 1935 and gone unrecognized because of the similarity of the symptoms to other respiratory diseases common in the area.

In 1940 a nervous disorder that had not been seen previously occurred in many flocks of brooder chicks in one poultry district in California. Practically all outbreaks of this nervous disorder accompanied or followed a respiratory disease thought to be infectious bronchitis.

In 1941 it was determined that the respiratory disease and the nervous disorder constituted a single disease entity and that the respiratory stage or type of the ailment was the well known "chicken flu," which had not previous to 1940 manifested nervous symptoms.

In 1942 Dr. J. R. Beach, University of California, determined that the new disease is due to a virus and suggested it be named avian pneumoencephalitis. In 1943 the same investigator demonstrated that the disease is immunologically related or identical to a disease known as Ranikhet in India and Newcastle disease in Britain, a serious plague in many parts of the world. Clinically the disease bore little resemblance to the plague in India, Dutch East Indies, Burma, the Philippines, Indo China, Malaya, Korea, Japan and other parts of the Far East, where it has long been known, or to the same disease in England, where it has been known since 1926, having been discovered in that year near Newcastle on Tyne. Many American veterinarians, with a predilection for eponymic terms still call it "Newcastle disease." In the Philippines it is called "avian pest."

During the winter of 1944-45 a respiratory disease occurred among many flocks in southern New Jersey. It was thought to be the usual seasonal visitations of coryza and little attention was paid to it. However, when chicks hatched in the spring, in flocks that had been affected during the winter, developed the same disease an investigation was made by Dr. F. R. Beaudette, who recognized

the disease to be the world wide plague.

During 1945 avian pneumoencephalitis was discovered at various places in New York and in the New England states and by August 1, 1946, was known to exist in 15 states and had been diagnosed clinically in several more. It might almost be said to have been found where one looked for it, and means for its control and eradication were engaging the attention of regulatory authorities.

The concern over avian pneumoencephalitis is due more to its history than to the losses it has entailed so far in this country. In the Eastern states, as in California, the disease has been mild in contrast to its devastating effects in other parts of the world. The capacity this disease has for destroying the poultry industry of a district is illustrated by its invasion of Natal at Durban in the Union of South Africa, December, 1944, where, by the way, it was promptly eradicated by the veterinary service, after it was recognized.

According to an account of the outbreak published in the March, 1946, issue of the *Journal of the South African Veterinary Medical Association*, the disease was, with few exceptions, confined to flocks belonging to Indians in the sugar-mill district along the coast both north and south of Durban. The Indians live in barracks and flocks up to a 1000 birds at a barracks was common.

The mortality was very high. "It was a common experience to visit a barracks and find only ducks walking around, a grim reminder of the deadliness of the virus." A few flocks belonging to native Africans were attacked but the disease seldom spread from such flocks. The reason: "Africans seldom buy fowls to take to their homes, and there is remarkably little movement of poultry from kraal to kraal. Poultry moves predominately in a one-way stream to Durban." Only a few flocks owned by Europeans were invaded. Where it occurred it was introduced on the premises through the purchase of birds for table use from Indian hawkers. The flocks were housed and cared for as well as any in the world yet—"One European had 22 miserable-looking survivors of a fine flock of about 850 white Leghorns. Another lost over 600 Leghorns, every one he had, but Bantams running with these fowl and turkeys on the same farm remained healthy."

The outbreak of pneumoencephalitis in Natal was eradicated by quarantining the infected area and preventing the movement of any birds, carcasses, feathers, poultry manure etc. into or out of the area or within the area except by official permission. Only 527 birds were killed by official order and approximately 3000 died after the quarantine was established. The total loss of chickens from the disease is estimated to have been 100,000 chickens. The case mortality was 95%. Flock morbidity varied from 35% to 100%. It was thought the virus did not remain infectious on the premises for more than two weeks after the infected birds were removed. Eradication was apparently complete. Although some 5% of the birds attacked by the disease recovered, a careful search revealed no carriers. The virus appeared not to be airborne or insect-borne.

The mild type of avian pneumoencephalitis, which to date has prevailed in this country, cannot be diagnosed clinically with the certainty essential in establishing quarantines The symptoms given by the Pathological Division of the B.A.I. include:

In chicks from a few days to a few weeks of age, dyspnea, depression and sometimes stupor initiate an attack. In a few days twitching of the head and neck, marked weakness and paralysis may supervene. In a few more days the chick either dies or makes a rapid recovery. Mortality varies from 10 to 60%.

In older birds the disease begins with respiratory symptoms. In laying flocks there is an abrupt and almost complete interruption of egg production. There are proportionately many soft-shell and rough-shell eggs among those that are layed. Paralysis is less frequent and the mortality is much lower than in chicks. Four to eight weeks are required to get the birds back into full production.

In broilers the symtoms are much like those in chicks, but the course of the disease is more prolonged and paralysis is more frequent. Growth and development are retarded. Mortality is sometimes high, in some few instances it has reached 50%.

The most conclusive diagnosis is based upon isolation of the virus, but virus-neutralization is regarded as sufficient in infected districts. An agglutination test is available but is less dependable than either of the foregoing. At present diagnostic facilities are greatly needed in many sections of the country to determine the extent of the disease as promptly as possible.

Beach has developed a vaccine that, under laboratory conditions, protects chickens from pneumoencephalitis, but it has been less effective in the field where the incidence of the disease is not materially affected by its use. However both the mortality and the decrease in egg production is lower in vaccinated than in nonvaccinated birds, and they attain full production much sooner after an attack. The prospects of improving the vaccine by further research are considered to be good.

(To be continued)

Suspected Equine Infectious Anemia in Man

By C. D. STEIN and L. O. MOTT*
Washington, D. C.

EQUINE infectious anemia under natural conditions is considered by most authors a specific disease of solipeds (the horse, mule, and donkey). However, a considerable difference of opinion exists among investigators as to the susceptibility of other species under experimental conditions. A review of the literature on this subject and a report of the Bureau's studies on susceptibility of other species were published elsewhere.[1]

Although man is presumed to be only slightly susceptible to the disease, two authentic cases have been reported in the European literature, that of Luhrs[2] in 1920 and that of Peters[3] in 1924. Both of these cases were verified by reinfection of horses and were briefly reviewed in the *Journal of The American Medical Association*[4] in 1936.

An article entitled "Equine Infectious Anemia Transmitted to Man," which recently appeared in the August 1945 issue of *Annals of Internal Medicine*, has stimulated new interest in this problem in the United States. The case described in this article by Johan T. Peters,[5] Visiting Professor of Medicine, Lousiana State University, New Orleans, is apparently the same case previously reported by him in 1924.[3] The object of reporting this case in American medical literature evidently was to emphasize the fact that the disease had been diagnosed in man.

Peters, in his recent article, pointed out that the symptoms of equine infectious anemia that he observed in this case were strikingly similar to some forms of aplastic anemia of unknown origin in man. He also mentioned the probability that cases of equine infectious anemia in man in the United States may be detected if blood of patients with so-called idiopathic aplastic anemia be inoculated into normal horses and suggested that such samples "be forwarded to the Veterinary Institution in Washington, D. C., for this purpose."

This Bureau, in turn, received requests from medical institutions in the United States requesting that horse inoculation tests be made on the blood of suspected cases for the presence of the virus of equine infectious anemia. Owing to the fact that the normal test horses available for this purpose were limited, only two samples were tested. The results obtained are described below.

*Pathological Division, Bureau of Animal Industry, Agricultural Research Administration.

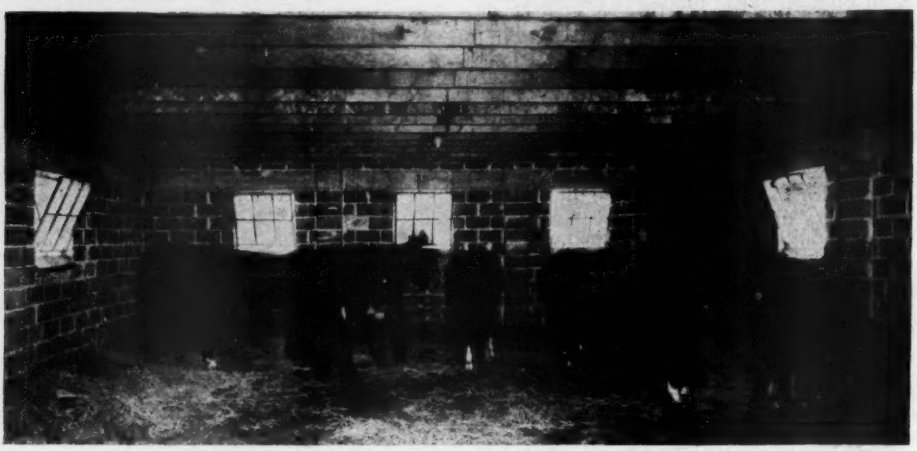
Case No. 1

Identified as No. 506331-A. F. Massachusetts General Hospital, Boston, Massachusetts (B.A.I. Spec. No. 7518). This case was first brought to our attention October, 1945, by Dr. J. Lerman, who requested that we examine the blood of one of his patients with aplastic anemia for the presence of the virus of infectious anemia. We were not in position, however, to make tests until December 31, 1945, when Dr. Norman P. Hill, a member of the staff of the above-mentioned hospital, furnished a report of this case as follows:

"The patient is a 20-year-old girl who entered this hospital on October 2,1945, with a complaint of chronic fatigue and malaise. Last April she began to have what she believed to be a persistent cold. She had low abdominal pains and was told she had infection in her kidneys. She had episodes of fever to 104° F. about every two weeks. This continued throughout the summer and in August she was given a small dose of sulfadiazine by her own doctor. She entered this hospital and was found to have a red count of three million with a hemoglobin of 9.4 grams and a white count of 1,500. Physically, she was pale and poorly nourished. There was a right lower quadrant McBurney scar in the abdomen, which was otherwise negative. The heart was not enlarged and there were no murmurs. The lungs were clear. No focus of infection could be found anywhere. The urine has been clear throughout her hospital stay. She began to manifest a fever of about 104° F. and was given intramuscular penicillin, which had little or no effect. She was then tried on oral penicillin, 1,200,000 units per day, and became markedly worse. During this time her white count dropped to zero. Her red count stayed nearly constant and the hemoglobin rose slightly. Then she was started on intravenous penicillin, a constant drip of 1,000,000 units a day. She did not respond well clinically and this dose was gradually increased to 6,000,000 units a day. Prior to this, three of 14 blood cultures showed alpha hemolytic Streptococcus. With this intravenous penicillin the white count rose to 4,800 and then dropped to 900. During this time she received several transfusions and her hemoglobin stayed at approximately 11 grams. With 6,000,000 units of penicillin a day her fever rose to 104° F. and stayed there. It was decided that this might be a penicillin reaction and it was, therefore, stopped

and sulfadiazine was given in spite of the low white count. The fever came down and is now running between normal and 100° F., the white count has risen to approximately 3,500. The red count is 3,000,000; hemoglobin, 10.3. Blood indices were normal throughout and the sedimentation rate was 0.6mm per minute (corrected) with a hematocrit of 37%.

"We have been unable to establish any diagnosis other than agranulocytosis or to incrimate any industrial poisons or medications which she has received. No focus of infection can be found and hence we are unwilling to make a diagnosis of overwhelming sepsis. It was pointed out at a conference here that this blood picture and clinical story fitted a diagnosis of equine infectious anemia. Hence, we are sending this blood sample to you for testing."



Some of the horses at Beltsville used in studies of equine infectious anemia

Horse Inoculation Test (*Case No.* 1).—January 7, 1946, a blood serum sample of about 10cc from this case was received by air express for testing. The sample of serum was immediately passed through a No. 8 Mandler filter candle and the filtrate was tested for sterility on suitable culture media. January 8, 1946, normal horse 1385 was inoculated subcutaneously with the sample of the filtered serum. The horse was held under observation in an isolated screened pen and temperatures were taken at least twice daily. The animal remained normal for 106 days, indicating that the sample of serum injected contained no virus of infectious anemia.

To determine if test horse 1385 was susceptible to the virus, it was then reinoculated on April 24, 1946, with a sample of whole blood from a known case of infectious anemia (horse 856, a known carrier). After an incubation period of 18 days, horse 1385 developed clinical symptoms of infectious anemia with a preliminary temperature rise of 102.4° F. followed by a second attack in which the temperature reached a maximum of 105.8° F. A third febrile attack followed. This horse, which is still being held under observation, shows indications of developing into a chronic carrier.

Hematocrit readings on blood samples collected at frequent intervals before horse 1385 was exposed to known infectious anemia virus, showed a range in the red cell volume of 39.2% to 53.0% with an average of 44.0%, whereas readings made subsequent to exposure during and following the febrile reactions showed a range in red cell volume of 34.5% to 39.8% with an average of 36.0%. This reaction indicates that horse 1385 was a susceptible animal and incidentally that the blood of horse 856, a carrier for more than 11 years, is still virulent. The temperature record of this horse prior and subsequent to inoculation with the human blood serum and also following exposure to known infectious anemia virus is shown in Graph 1.

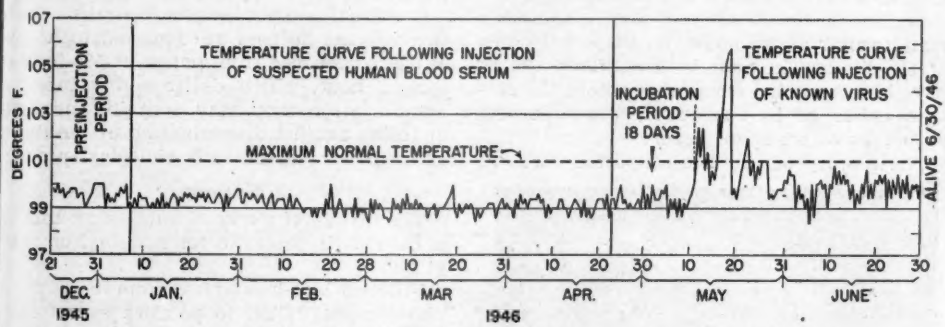
Case No. 2

Identified as No. 2-F. G. University of Kansas Hospital, Kansas City, (B.A.I. Spec. No. 7532). The blood sample was obtained from a case of hypoplastic anemia, etiologic factor unknown. The following data on this case were furnished by Dr. Sloan J. Wilson, Assistant Professor of Medicine, School of Medicine, University of Kansas:

"The patient, a 13-year-old girl, first entered the hospital in May, 1945, because of profuse menstruation of three weeks' duration. She also was weak and tired. There was slight bleeding of the gums. Repeated physical examinations have been essentially negative. The blood picture has shown a repeated anemia, the red cell count ranging between 2.5 to 3.5 million. The total

white cell count ranged between five and six thousand. The neutrophils have always been low in absolute number. The lymphocytes have been approximately normal or slightly increased in absolute number. The monocytes have always been relatively and absolutely increased, ranging from 37 to 49%. These monocytes are all of the normal mature type. The platelet count has always been low, ranging between 20 and 30 thousand. Giant platelets have been observed. Sternal bone marrow was examined January 10, 1946. Grossly, it was moderately hypoplastic. No leucemic cells were observed. The myeloid-erythroid ratio was abnormal in that the red blood cells were decreased in number. The sample. The test horse was held under observation in an isolated, screened pen and temperatures were taken at least twice daily. The animal remained normal for 93 days, indicating that this blood sample did not contain the virus of infectious anemia.

To test the susceptibility of test horse 1128, it was injected subcutaneously on April 24, 1946, with a blood sample from carrier case 1353. On May 16, or 22 days following the injection, horse 1128 developed clinical symptoms of infectious anemia with a maximum



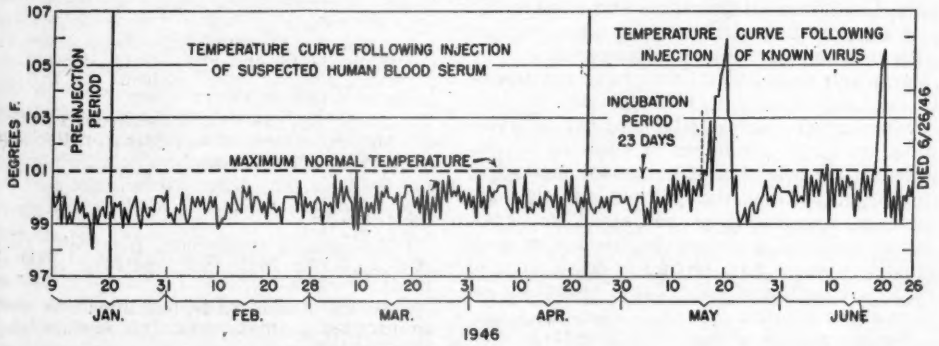
GRAPH 1. TEMPERATURE RECORD OF TEST HORSE 1385

myeloid elements existed predominantly at the myelocyte level and there was a decrease in metamyelocytes and mature neutrophils."

The whole blood sample from this case, after the addition of a small amount of normal saline, was thoroughly ground in a Ten Broeck grinder. The sample was then centrifuged and the supernatant was filtered through a Zeiss filter. Culture tests of the filtrate were then made in suitable culture media.

Horse Inoculation Test (Case No. 2).—Normal horse 1128 was inoculated January 21, 1946, subcutaneously with the filtered blood

temperature of 106.2° F. A second febrile attack occurred June 20 with maximum temperature of 105.6° F. followed by death on June 26. Autopsy and histological examination revealed alterations associated with infectious anemia. Hematocrit readings on blood samples collected at frequent intervals before horse 1128 was exposed to known infectious



GRAPH 2. TEMPERATURE RECORD OF TEST HORSE 1128

anemia virus, showed a range in the red cell volume of 40.0% to 53.0% with an average of 46.0%, whereas readings made subsequent to exposure during and following the febrile reactions showed a range in the red cell volume of 34.4% to 40.8% with an average of 37.5%.

The results of this test indicate that normal horse 1128 was susceptible to the virus and incidentally showed that the blood from a 3.5-year carrier horse is still virulent. The temperature record of horse 1128 prior and subsequent to inoculation with the human blood serum and also following exposure to known infectious anemia virus is shown in Graph 2.

Discussion

Although certain species of flies and mosquitoes which transmit the disease mechanically among horses are also known to attack man, insofar as we know, no suspected cases of the disease in man in the United States have been reported from areas where the disease exists or in connection with sporadic outbreaks of an acute nature.

The history of the two suspected cases of

Inoculation of the two test horses with blood from an infected animal showed both animals to be susceptible since they developed infectious anemia

infectious anemia in humans described in the foregoing, which were negative to the horse inoculation test, indicates that neither of the patients had been in close contact with horses, whereas the two positive cases previously reported in European literature and cited in the introduction had a history of close contact with infected horses over a long period.

Kral and co-workers,[6] who have mentioned the danger of spreading the disease through the use of contaminated biological products have set forth a number of rules to be followed in the selection of horses for serological institutions. They also pointed out that infectious anemia virus contained in antiserum could be destroyed by the use of such preservatives as 0.5% phenol or equal parts of 0.6% tricresol and ether and aging for at least three months.

Verge,[7] who considers that infectious anemia of horses is only exceptionally transmissible to man, has pointed out (1) that the danger of infection from therapeutic sera of equine origin is rare because of the careful selection of horses and the constant surveillance which sera undergo during preparation (aging, heating, and addition of antiseptics); (2) that in spite of extensive consumption of raw horse meat in some European countries, no cases in man have been reported from this source, and (3) that the treatment of pernicious anemia in man with extracts of horse liver has been harmless.

In experiments reported elsewhere,[8] Bure[illegible] investigators found that the virus contain[illegible] in equine antisera could be inactivated [illegible] holding at a temperature of at least 58° [illegible] 59° C. for one hour, by certain chemical pr[illegible] servatives in proper concentration or by t[illegible] combined process of fractionation, heati[illegible] and dialysis used in refining certain antise[illegible]

Biological supply houses operating und[illegible] Government licenses are required to heat [illegible] antisera prepared from horses at 58° to 59° [illegible] for an hour, which destroys any infectio[illegible] anemia virus they may contain, thus saf[illegible] guarding against dissemination of the disea[illegible] through the use of such biological produc[illegible]

Summary

The history of a case of aplastic anemia a[illegible] a case of hypoplastic anemia in humans [illegible] given.

Filtered blood samples, from both of t[illegible] above cases, failed to produce symptoms [illegible] infectious anemia when injected into norm[illegible] test horses, indicating that there was no co[illegible] nection between these cases and infectio[illegible] anemia of horses.

The susceptibility of the normal test hors[illegible] was confirmed by subsequent exposure to [illegible] known strain of virus.

Incidentally, the blood from two carri[illegible] cases, one of 11 years' standing and the oth[illegible] of 3½ years' standing, used as exposure m[illegible] terial in these experiments was demonstrat[illegible] to be still infectious.

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Treatment of Equine Colic by Intravenous Injections*

By A. BRION
Paris, France

N a preceding article (A. Brion, Colic. *Encyclopedie Veterinaire Periodique*, 1944, No. we have set forth the reasons which make believe that in the majority of cases, the olics in the horse, which are supposed to ise from gastic indigestion or acute intesnal indigestion, have their origin in a spasm the pylorus or of the intestine. This of ourse is contrary to the classic doctrine hich insists that they result from gastrotestinal paresis, and must be combatted by imulating and arousing peristaltic action the digestive reservoirs. A number of our olleagues have written us, as a result of the rmer article, that they are entirely of our pinion, and relate disappointments experinced in the use of excitomotor therapy. They re agreed in denying, save in a few rare xceptions, the role of alimentary indigestion; he sick animals having almost never ingested tions which were indigestible either because o great quantity or on account of composion. The field of spastic colic is therefore uch wider than has been thought.

These colics result from lack of equilibrium in he action, which should be harmonious, of the arasympathetic and the orthosympathetic, egulators of the gastrointestinal automasm. If we knew exactly the physiology of the astrointestinal innervation in the horse, it ould be easy to know the part played by each n the production of spasm. We do not deceive urselves as to the hazards of drawing conlusions as to one species of animal from facts pplying to another, and all the experiments ade on this subject have applied to small aboratory animals. However, it is very generlly admitted that the cholinergic fibres of the arasympathetic augment the tonus and the otility of the smooth fibres of the stomach, nd intestine, while adrenergic fibres specially umerous in the orthosympathetic, diminish onus, slow peristalsis and induce active dilaation of the viscera. Consequently parasympahomimetic medicaments, like pilocarpine, recoline, eserine, acetylcholine, excite moility, while this last is inhibited by the arasympatholytics such as atropine. But an mportant reservation must be made: it deals with the pyloric innervation, which appears rossed in relation to gastric innervation. Most of the experimenters have shown that the closing of the pylorus is due to orthosympathetic excitation, and that vagotony does not in any way disturb it. Does the same hold good for the horse? Experiments that we have actually conducted with our colleagues Prof. Tazand and Mr. Barone, will show us. If our first results confirm it, the horse does not escape from the rule formulated above, and spasm of the pylorus, generator of gastric indigestion, will justify treatment by parasympathomimetics, while so many manuals of therapy recommend the parasympatholytics, a medication which seems irrational.

If we set aside this question for the moment, the fact remains that intestinal spasms are provoked by a parasympathetic hyperexcitation. This fact does not solve the problem of colics, which is, singularly, more complicated. After the spasm, alimentary matter is stopped and ferments; the gases are blocked by the obstacle which prevents intestinal transit. The section which encloses them, may then be abruptly dilated, and according to the mechanism explained by Morin, this sudden dilatation is the point of departure of a reflex putting into play the sympathetic fibres and resulting in active dilatation of the intestine below as well as above the obstacle. Thus in certain cases, and especially when the food is fermentable, there is superposed on the spasm at the end of a longer or shorter time an active dilatation which can yield only to the inhibitors of the orthosympathetic. At this point it may be imagined that the rational therapy of colic is only a question of chance.

But if action is taken sufficiently soon after the beginning of the painful crisis, there are as yet only spasms, and a good parasympatholytic medicine should be able to inhibit the vagal action, and therefore bring about a cure, and the disappearance of pain, without the use of sedatives like opium or chloral. Certain interesting results have been reported with drugs of this type—atropine, homatropine, surparine (a mixture of perparine and novatropine) (Gand), propivane (Bellocq and Louf), or with sympathomimetics like adrianol (Van Recum). These last are dangerous because they expose to the dilatory reflex. The atropine groups, excellent vagolytics, have unfortunately a very marked activity on the

*Brion, A. Traitement des coliques du cheval par les injections intraveineuses de novocaine. *Bulletin de L' Académie Vétérinaire de France*, 18:9, pp. 284-288. 1945.

heart and on the vision. In addition they retard the digestive secretions, which is a great disadvantage.

We ask ourselves, in the aforementioned article, if the action of novocain, intravenously might not be tried. "It seems impossible" wrote Hazard recently, "to overcome the idea that novocain is only a local anesthetic." Injected into the general circulation, it acts as an inhibitor of the autonomous nervous system. We will recall very briefly the results obtained by Hazard and his collaborators, Cheymol, Quinguand, Corteggioni, Vaille, and by Raventos, who showed this inhibitory action on the effects of certain poisons modifying the main vegetative functions. Novocain prevents nicotine from causing successively acceleration and slowing down of the intestine, by parasympathomimetic, followed by sympathomimetic action. It does the same with lobeline. Hordenine, acetylcholine, are without effect on the intestine when the subject has received a preliminary intravenous injection of novocain. Thus, these experimental facts confirm what was shown in the clinic on the treatment of the crisis in human asthma (Dos Ghali, Bourdin, and Guiot.)

Intravenous injection of novocain has never, to our knowledge been used in veterinary therapy. Marcenac and Lémetayer have used cocaine, in the case of doping, to awaken horses anesthetized by chloral.

We have utilized solutions of novocain without the addition of adrenalin, in 1% to 5% strength physiological serum or in boiled, distilled water. In the normal horse we found that intravenous injection of 0.04 to 0.20gm per 100kg body weight accelerates slightly the cardiac rhythm (from 10 to 20%), reinforces the contraction of the myocardium and diminishes the respiratory frequency (from 20 to 30%). We have not been able to fix the toxic dose, for reasons of an economic order. Horses, ready to be slaughtered for the market, have borne without difficulty slow injection of 0.4gm per 100kg body weight. In one instance, after rapid injection (in 15 seconds) of 0.5gm per 100kg in a 5% solution, the animal lay down, as though afflicted with vertigo, and got up a few minutes afterwards. These doses are much lower than those used for pharmacodynamic studies, which are of the order of 0.02 to 0.05gm per kilogram body weight. For therapeutic purposes, we have never exceeded 0.2gm per 100 kg. and, in general, interesting results have been obtained with 0.1 to 0.12gm per 100kg body weight. It is very important to administer the injection slowly, if possible taking one minute for the injection. Intracarotid injection, gives more rapid effect, perhaps, than intrajugular, b is not at all necessary.

These preliminaries being settled, we ap plied novocain in the treatment of colic added to our own observations are thos kindly made for us by our colleagues, Mes sieurs Bedoiseau, of Chalon-sur-Saone; Be soux, of Allériot, and our pupil, Monsieu Tourdes, who will record these observation in his thesis. We call attention to four typica examples of the effect of novocain in colic o purely intestinal spasm, that is, before an secondary phenomenon has been produced.

1. An army horse had eaten his normal ratio of hay and oats in the morning. He was take with colic toward noon; the seizures were violen from the first, the horse incessantly lying dow and getting up again. At the end of two hour we injected 1gm of novocain intravenously. Th animal was returned to his stall; he was calm, n longer lay down. In the evening, he passe diarrheal excrement; everything was in order th next day.

2. A filly two years of age, weight 400kg re mained in the meadow all day, in January, sev eral days after the snow had melted. She wa brought into the stable at evening and her ratio of hay put before her. She sulked at first, the began to eat, when she was suddenly taken wit colic which soon became violent. One-half hou afterwards, she received 0.4gm novocain intra venously. At the end of several minutes, the ani mal was quieted, breathed more freely and la down to rest; completely recovered.

3. A horse 12 years of age, weight 450kg at his ration composed of oats, good hay and straw normally in the evening. One hour after feeding he was taken with moderately intense colic. He was treated first by dry rubbing, an injection o eserine and a hypnotic. The colic did not yiel to this treatment. The following morning, h was given an intravenous injection of 0.4gm o novocain. Quiet returned, the release of gas wa frequent, and abdominal pain disappeared. The animal was seen two hours later. The owne stated the animal had not moved in that time.

4. A mare weighing 600kg, pregnant nine months, worked in the morning, returning to th stable about 10 o'clock, received her ration o two liters of oats and a quantity of well pre served hay. Two hours later she suffered an ex tremely violent attack of colic, assuming abnor mal attitudes, exhibiting ephidrosis on the neck and buttocks, having abundant alvine evacua tions and frequent and sonorous borborygmus During the hour following these attacks, the ani mal received 0.8gm of novocain. The return to quiet was immediate, and the colic definitely disappeared.

The drawbacks to this treatment occur firs in colic caused by obstruction, against which obviously no action can be taken. The follow ing is illustrative of such cases: A horse tha had suffered repeated attacks of colic wa given novocain during a crisis. The pain yielded, but returned in one-half hour. Recta exploration discovered a calculus caught a the pelvic curve. Sedation of the pain follow

ing injection of the novocain is explained by the disappearance of the spasm which squeezed the stone, but the latter, continuing its movement, again irritated the intestine, which again contracted to repeat the cycle.

Novocain is also inefficacious in the case of torsions, and invaginations. Finally, it has little action when application is late and the active dilatations have been effected by means of the orthosympathetic sedatives. At this point, we have the complex noted above, where therapy must be applied blindly. In any case, since novocain is destroyed in the blood in 15 to 25 minutes, with formation of para-aminobenzoic acid, it can have only a fleeting action. If sedation is not obtained in a quarter of an hour, and if the dose has been sufficient, it is usually an indication for a change in the diagnosis and a different treatment.

To sum up, novocain seems to possess a remarkable inhibiting action on intestinal spasms which produce colic. It is without the drawbacks of the parasympatholytic sedatives of the atropine type. It effects radical cures almost instantaneously, provided it is used soon after the onset of the colic, that is when the intestinal spasm exists in an uncomplicated state. Its action is shown immediately, since it can be observed only in the first 15 or 20 minutes following its injections.

Diseases of Economic Importance in the Southeastern States*

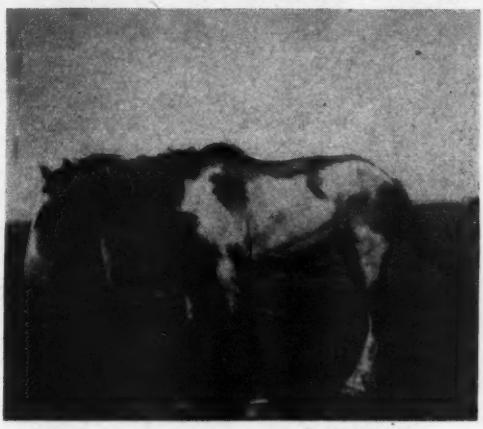
Recently a survey was made of the 13 southeastern states to determine the diseases that are causing a loss of farm animals in that territory and the relative importance of each. An imposing list of destructive diseases was found in this survey and the aggregate economic loss they occasion each year is little short of appalling.

After the survey was completed representatives of the state experiment stations in the area and of the Regional Animal Disease Research Laboratory at Auburn, Ala., met to consider research plans to alleviate the situation. It was obvious that the diseases causing the greatest economic loss are those concerning which we already possess the most information. This means that the application of science to disease control and prevention is far behind our scientific knowledge of those subjects.

At the conference, after canvassing the whole situation and evaluating the problems revealed by the survey, further research into the problems of eradication or control of the following diseases was recommended:

Cattle.—(1) Brucellosis, (2) mastitis, (3) anaplasmosis, (4) Johne's disease, (5) internal parasites, (6) pneumoenteritis of calves, (7) infectious keratitis, (8) milk fever and acetonemia complex and (9) respiratory diseases.

Swine.—(1) Brucellosis (public health aspects), (2) erysipelas, (3) internal parasites, (4) enteritis complex, (5) respiratory diseases and (6) nutritional diseases.



Equine infectious anemia is of economic importance in the Southeastern States

Sheep and *Goats.*—(1) Internal parasites, (2) pregnancy or nutritional disease and (3) pneumonia complex.

Work Stock.—(1) Nutritional diseases, (2) internal parasites, (3) infectous anemia, (4) diseases of the central nervous system and (5) skin diseases.

Poultry.—(1) Fowl typhoid, paratyphoid and pullorum disease, (2) leucosis complex, (3) reproductive disorders, (4) tapeworms and (5) enteritis complex in turkeys.

It is not to be inferred that the foregoing are the most important diseases of the Southeastern States. Definitely they are not, but those on which research was deemed likely to be most fruitful. For example hog cholera, by long odds, economically the most important disease of swine in the area, was not recommended for research, since it was thought unlikely to be as profitable as research on disease less thoroughly understood.

Relatively little work has been done heretofore on animal disease research projects by the Southeastern States.

Sheep and goat raising is unimportant in the states included in the survey except in Texas.

*Notes from a discussion, by Dr. Howard W. Johnson, Regional Animal Disease Research Laboratory, Auburn, Ala., at the 21st Annual Conference for Veterinarians, School of Veterinary Medicine, Alabama Polytechnic Institute, Auburn, February 26, 27 and 28, 1946.

Operation for Pyometra and Cystic Ovaries in a Bitch

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Petoskey, Michigan

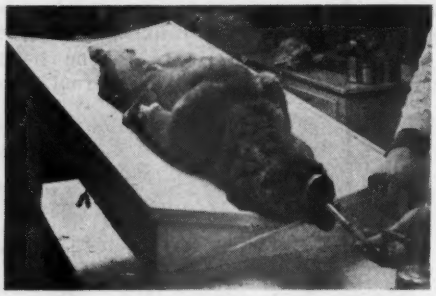

Figure 1

Figure 2

Figure 3

THE illustrations indicate the treatment of a German shepherd suffering from pyometra of both horns of the uterus and having, as is usual in such cases, cysts on both ovaries. The operation was performed in the veterinary dispensary at Fort Custer. The bitch belonged to the Commanding Officer of the Station Hospital.

Fig. 1 shows the animal under complete, surgical anesthesia, induced by the ether auto-inhalation method (Hardenbergh & Mann) just before draping for the operation.

In Fig. 2, the draping is completed. The anesthetist shown is Sgt. Arnold Wickman and the surgical assistant, Sgt. Vernon Linder. At this stage the right ovary had been lifted out of the abdominal cavity and all ovarian vessels securely ligated.

The ligation of the left ovarian vessels and all of the uterine vessels posterior to the junction of the horns is shown in Fig. 3. The uterus was then double clamped with hysterectomy forceps close to the cervix and carefully packed off to preclude leakage into the abdomen when the organ was ablated. The uterus was excised between the two forceps and then removed.

Lastly, the short stump of the body of the uterus has been carefully lifted with tissue forceps, the hysterectomy forceps removed and the body stump packed with sulfathiazole powder and sutured with three layers of continuous Lembert sutures (No. 0 chromic catgut).

The midline incision was closed with four rows of sutures as follows:

1. A row of continuous sutures (No. 0 chromic catgut) in the peritoneum and fascia.

2. A row of continuous sutures in the anterior or ventral fascia, using double strand, No. 0 chromic catcut. Substantial bites of fascia were included in the sutures, but the musculature was excluded as sutures soon cut through the muscle tissue and become loose. Three interrupted sutures were also inserted in this fascia as a safeguard, since this patient was a large, heavy bitch.

3. The subcutaneous fascia was closed with a row of continuous sutures (single strand, No. 0, chromic catgut) which closely approximated the edges of the skin.

4. The skin was closed by interrupted, medium fine, dermal sutures.

A sterile pack, in which sulfathiazole powder was incorporated, was placed over the incision

and then a bandage was put around the body with four-inch-wide bands of adhesive tape, sufficiently long to overlap in an X shape on the ventral surface.

All skin sutures were removed by the 8th day following the operation. Recovery was uneventful.

It may be of interest to describe briefly the auto-inhalation apparatus used in this case and the technic for its use. As may be seen in the illustrations, the receptacle for the anesthetic is a one-pound ether can. In the top of the can two brass tubes, 1cm in external diameter, are soldered. The one in the center of the can is fitted with a short piece of rubber tubing. The other spout is for free intake of air over the surface of the ether and also for pouring more ether into the can as needed. For the best results, when in use, the can should be about half filled with ether.

The regulating apparatus shown in the illustration is attached to the rubber tubing on the ether receptacle and by a second rubber tubing to the intratracheal tube. There is an air valve near the top of the vertical part of the apparatus and another in the parallel part which serves to prevent rebreathing of air, supplies additional air when desirable and as required cuts down the intake of ether. Each valve is regulated by a sliding sleeve, which fits over the openings in the tube and can be slipped away easily from or over the openings as needed.

The intratracheal tubes are made of light weight chromium plated brass tubing, such as are used for bathroom fixtures. Tubes of various diameters are cut in about 15-inch lengths so as to secure a snug fit in the tracheas in dogs of all sizes. The average dog weighing from 20 to 30 pounds will take a tube with a diameter of from 1.2 to 1.4cm. These tubes should be kept clean inside and out and ready for use. We prefer to sterilize the tubes and rubber tubings, although this may not be imperative. However, it gives a feeling a security.

Anesthesia is induced in an ether cabinet (an air tight box approximately one meter in length, 45cm in width and 75cm in height). The lid and one side are provided with heavy plate glass windows so that the animal may be observed easily. The lid is also provided with an opening through which a funnel is inserted and which serves for pouring the ether into the cabinet. The heat from the animal's body helps to volatilize the ether. It takes an average of from 150 to 200cc of ether to induce anesthesia. This occurs in from eight to 15 minutes. More ether may be used if the induction is too slow. With this method the animal does not exhibit fear, struggling or shock reaction before it loses consciousness, the usual response when cone method of anesthetizing with ether is used.

The animal should not be anesthetized until all pre-operative preparations are completed. When unconscious, the dog is removed from the cabinet and profound anesthesia induced by the cone method. It is then placed on the operating table on its sternum with hind legs spread laterally. The head and neck are extended upward, the mouth opened wide by the attendant, the tongue firmly grasped with tongue forceps and pulled straight forward between the lower canine teeth. With a small flashlight the epiglottis and vocal cords can be seen easily. During inspiration the vocal cords separate widely and at this time the intratracheal tube is inserted from two-thirds to three-quarters of the way down to the bifurcation of the trachea. With a little practice the intubation is easily accomplished in a minute, but it should not be attempted if lingual and laryngeal reflexes are present. More ether with a cone should be given until surgical anesthesia is reached. When the tube is inserted in the trachea, the animal is put in any position desired and the tube connected to the ether can.

It was my good fortune to become familiar with this technic at the Institute for Medical Research, Mayo Foundation, Rochester, Minn. I have used it with gratifying results for the past 11 years. It has proved a safe method for inducing and maintaining long-continued, surgical anesthesia, without causing postoperative pulmonary complications. The anesthetist's job is greatly simplified by this apparatus, and if the animal should be over-anesthetized, which happens much less frequently than with the cone method, artificial respiration is much more effective and prompt since the tracheal tube prevents obstruction of the air passages. The auto-inhalation method is less expensive since preliminary medication such as morphine, atropine and nembutal are unnecessary and, in my experience, do more harm than good. There is no chance for aspiration of saliva or blood into the lungs with a snug fitting tube and, of course, the animal should always be placed on an inclined plane (head lower than body) at an angle of about 10 degrees or more. The life of many a dog has been terminated as a result of pulmonary complications from aspiration during ether inhalation, with the animal lying on its back on a horizontal plane and, instead of having head and neck extended and lowered, being held at right angles to the axis of the body. An operator who fails to heed these precautions invites trouble and disaster.

Common Diseases of the Eye in the Dog*

DISEASE and injury of the eye constitute 10 to 15% of the average small animal practice. The loss of an eye in a dog means a great deal to the owner of the dog. He regards it more seriously than does, for example, the owner of a cow regard the loss of an eye in his animal. The eye of the dog is very expressive and its loss detracts much from the appearance and attractiveness of the animal.

Little has been published on the ailments of the eye in the dog and for literature on the subject we must rely principally upon literature dealing with the human eye. Unfortunately it is not entirely applicable to the ailments, operations and treatment of the eye of the dog.

Examination

In an examination of the eye in the dog, the history of the ailment, naturally, should be obtained and in addition a history of the systemic condition of the animal. There are certain systemic ailments that profoundly influence the condition of the eyes. In making an examination of the eye a systemic examination of the animal also should be made. The part adjacent to the eye should receive particular attention.

For an examination of the interior of the eye the animal should be taken into a dark room and the ophthalmoscope with integral light should be used. For examination of the cornea the animal should face the brightest light available. The cornea should be viewed both from the front and the side. Then the eye should be flooded with fluorescein and inspected again. A hand lens or magnifying glass is essential to examination of the eye in most instances. In an examination of the conjunctiva the eyelids should be everted. The mobility of the eyeball should be noted also.

Entropion and Ectropion

Entropion, the condition where the margin of the upper or lower eyelid is turned in to a degree that the eyelashes impinge upon the eyeball, is common in chows, airedales and spaniels. It occurs, but less frequently in other breeds. It is painful and most annoying to the animal. The dog with entropion is a pitiable object and veterinarians should always operate to relieve it, entirely irrespective of whether or not they expect to get a fee for the operation. The operation is a simple one and consists of removing an eliptical section of skin from the eyelid to allow the margin of the lid to be pulled into proper position when the wound is sutured. Nembutal anesthesia is much preferable to local anesthesia for this operation.

Ectropion is the opposite condition and is relieved by a similar operation on the mucous membrane of the underside of the lid. It usually involves the lower lid and by many is considered normal and a mark of beauty in bloodhounds and English bulldogs.

Membrane Nictitans

Due to inflammatory processes the membrana nictitans often extends over the eye to a degree that it interferes with vision. This membrane is useful to the dog as a protection to the eye and for the removal of particles of dust or other material that may lodge on the eyeball. It should not be sacrificed needlessly. With proper treatment of the inflammation and the removal of any tumors that may be on it or behind it, it can usually be returned to its proper position. If not, partial or complete removal is indicated.

Harder's Glands

Harder's glands frequently become enlarged and unsightly; particularly in the breeds of dogs that have prominent eyes. Further, if of long standing, they may cause conjunctivitis or even keratitis and obstruct the natural drainage of tears. Enlarged Harder's glands require surgical removal. The operation is performed easily under local anesthesia. Care should be observed to avoid injury to the membrana nictitans. Hemorrhage may be controlled by pressure of the finger at the canthus and instillation of a few drops of 2% epinephrine solution.

Keratitis

Keratitis is inflammation of the cornea. It may be superficial or deep and of all degrees of severity from a simple bluish discoloration, that clears up spontaneously, to ulceration and perforation that destroys the eye. It may be due to internal causes or to external injury and infection.

Normally the cornea is clear and lustrous, viewed from any angle. When it becomes roughened, stippled, eroded, bluish, cloudy, bluish white or yellowish grey it is because of infection. Ulcerative keratitis is characterized by the development of tiny, but visible blood vessels arising in the sclera and converging toward the pupil. These blood vessels are deep if the inflammation is deep-seated and superficial if the inflammation is superficial.

*Notes from a discussion by Dr. S. W. Haigler, St. Louis, Mo., at the 21st Annual Conference for Veterinarians, School of Veterinary Medicine, Alabama Polytechnic Institute, Auburn, February 26, 27 and 28, 1946.

As the infection progresses, a diffuse conjunctivitis ensues.

Flooding the eye with fluorescein aids much in recognizing superficial areas of erosion or roughness since they stain while undamaged portions of the cornea are unaffected. This dye is useful also in the treatment of corneal ulcers since the staining aids one in determining from day to day whether the ulcer is healing or extending and getting deeper.

The treatment of non-ulcerative, superficial keratitis is the same as for catarrhal conjunctivitis, protection from light and the application of mild antiseptic ointments or irrigation. If one or more ulcers are present they should be watched closely and if extending in spite of the antiseptic applications they should be cauterized promptly since they may worsen fast and destroy the eye in a short time. A convenient method of cauterizing is to dip a wooden applicator into 95% phenol and jar off the hanging drop. While the applicator is still moist touch the ulcer and after one second, touch with a cotton swab moistened in 50% alcohol. The ulcer should turn white when touched but no phenol should extend beyond the margin of the ulcer. In the treatment of keratitis atropine should be instilled into the conjunctival sac to dilate the pupil and lessen the chances of adhesion of the iris. After cauterization of the ulcer a 0.25% solution of silver nitrate is a desirable fluid for irrigating the eye. It should be followed immediately by flooding the conjunctiva with sterile normal saline solution.

Systemic treatment as indicated should be employed in addition to the local treatment, particularly in deep seated and ulcerative keratitis. The sulfonamides and penicillin may be useful in infections originating in the blood or lymph supply of the eye.

In severe attacks of keratitis, it is important that the eye have complete protection from light and injury. This is best secured by bandaging the eye and taping the dew claws.

Since corneal ulcers are extremely painful general narcotics such as the bromides, barbiturates or acetanilid should be administered. By affording the animal relief, rest and sleep, these analgesics contribute to its general well-being and improve the chances of recovery. Furthermore this relief of pain is a humane act that should not be neglected.

If the pressure within the eyeball causes protrusion of the cornea the anterior chamber may be drained. If the deeper layers of the cornea bulge through the opening in the superficial layers (staphyloma) caused by a deep ulcer and the hernia, when pushed back, recurs immediately the pressure is removed, it may be shaved off. If perforation of the cornea occurs and the aqueous humor becomes infected the eye should be enucleated without delay, otherwise the inflammation may extend along the tract of the ophthalmic nerve and involve the meninges of the encephalon with fatal results.

Conjuctivitis

Catarrhal conjuctivitis in the dog may result from any irritation of the conjunctival membrane. Irritant gas, dust, collyria and trauma are common causes. The most frequent cause of simple conjunctivitis is wind resulting from permitting dogs to ride in cars with their heads out of the windows, or to ride upon the running board.

The treatment of choice: confine the animal in a darkened room and irrigate the eye frequently with mild antiseptics.

Purulent conjunctivitis is more severe than the catarrhal type. A majority of the acute cases are sequels to distemper. The inflammation is intense, the appetite is suppressed, and the animal is dull. The most effective treatment is to flood the eye with a 0.25% solution of silver nitrate and irrigate immediately with sterile normal saline solution. Afterward the application of mild silver or mercury ointment is indicated.

Traumatic conjunctivitis is a term applied to an inflammation of the conjunctiva due to obvious, gross traumatism, such as injuries due to bites, scratches and blows and foreign bodies such as barley or cheat grass awns, foxtail heads, splinters, twigs or portions of cornstalks or weed stems. It is like the catarrhal and purulent forms, in that all three are essentially non-specific infections and treatment consists simply in combatting the infection. In the beginning traumatic conjunctivitis may be circumscribed. Treatment consists of removing the foreign body, if any, and combatting the infection.

Displaced Eyeball

Extrusion of the eyeball is always an alarming condition to the owner. It is common in Pekes, Bostons, poodles and other popeye breeds. The eyeball can be replaced successfully if the nerve and vascular mechanism is intact. If swelling has occurred anesthetize and clip the outer canthus with scissors. When the eyeball is replaced the incision at the canthus is sutured to retain it. It is very important that the sutures be so placed as not to touch the eyeball or they will speedily set up a severe conjunctivitis. Because of possible drying, trauma and infection the eye should be observed carefully for a few days and antiseptic irrigations or ointments employed if indicated.

Susceptibility of Female Rat to Brucellosis

By ALBERTO A. ASCOLI**
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DURING the past two years (August, 1944, to August, 1946) Dr. Herbert J. Metzger and myself, in following a suggestion of Dr. Robert A. Cooke, tested the protective power, against *Brucella abortus*, of sera drawn from normal cattle and from cattle immunized with Strain 19 vaccine, and also from cattle affected with brucellosis. Our tests were carried out with young, adult albino rats, ranging in weight mainly from 100gm to 140gm and unselected with regard to sex. These rats were inoculated intraperitoneally, first with small amounts (less than 1cc) of serum and then, after a few hours, with a lethal dosage of Brucella organisms. After a few months of frequent close inspections and careful necropsies, I observed that, on the average, the females died earlier from the infection than did the males. Thus I unexpectedly discovered a fact hitherto unnoticed, since the sex factor had thus far been disregarded in research work on Brucella infection of rats.

Method of Investigation

The extent of the damage to the inoculated animals can be estimated through clinical examination, time of death, or lesions observed on post-mortem examination. The animals that did not die from the infection were killed by injection of chloroform. A thorough inspection of the abdominal and thoracic organs, including the thymus and the gonads, was made in all the animals. To ascertain whether secondary invaders were involved, a bacteriological examination of the blood was also carried out routinely. When the autopsy showed some lesions, which seemed to be caused by other pathogens, a bacteriological examination of the diseased tissues was made, and the causative agent isolated in pure culture. In order to investigate their possible role in the mechanism of the infection, a bacteriological examination of the ovaries and testicles was made frequently. Whenever ascites, exudates or swollen mesenteric lymphnodes were observed at the autopsy, these were submitted to bacteriological examination as was also bloody urine when present. In a few cases the thymus, thyroid, kidneys and adrenals were cultured also in order to get a complete picture of the spreading of *Br. abortus* through the body.

The post-mortem findings are manifold and vary with the span of time between the inoculation with the Brucella organisms and the death of the rats. Schematically, the course of the infection in rats inoculated intraperitonally may be acute, subacute, or chronic.

In the acute form the animals die within two days; sometimes even during the first 24 hours after inoculation. At necropsy, the lungs show congestion and petechial hemorrhages are revealed on the pleura; the thymus also displays evidence of congestion; reddish brown areas of discoloration suggesting hemorrhages are seen in places; the liver has the characteristic gross appearance of a rather diffuse cloudy swelling; the spleen is black and pulpy, sometimes a bit enlarged. The other organs of the peritoneal cavity, the mesenterium, the omentum, the genital tract —especially the ovaries and the horns of the uterus—may show an increased vascularity. In some animals the mesenteric lymphnodes are enlarged, swollen, juicy and markedly varigated in color owing to alternating grayish pink and reddish brown areas.

In the animals, in which the infection takes a subacute course, death occurs from the 2nd to the 6th day. In such animals it was noticed that the petechiae on the pleura were still present but that the red color had faded toward grayish. Congestion of the median portion of the omentum was not apparent, but the tissue appeared to be increased in density. In a few cases extravasation which, as we shall see, is among the characteristic findings frequently observed in the peritoneal cavity, is accompanied by a similar effusion of fluid into the pleural cavity. The most characteristic changes, however, take place in the liver and the spleen. The inspection of these organs shows progressive changes in the tissues, which are due directly to the toxic action of the Brucella organisms and also to circulatory disturbances caused by some obstruction of the blood or lymphatic vessels concomitant with the pathological changes in the omentum. The liver which, in the normal albino rat is deep red, becomes paler and soon evidence of degeneration sets in. If the animals live long enough, the process goes so far as to give the pattern of the so-called nutmeg liver. The spleen shows changes which are caused by gradual replacement of the normal tissue by the diseased tissue. The various stages lead to aspects for which I use the terms speckled and ochra. When healthy and diseased tissue alternate the spleen looks speckled; when the splenic tissue is wholy degenerated or necrotic

*This study was supported by the Mennen Fund.
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the organ assumes an ochra appearance. The spleen becomes pale and obviously small. Adhesions to the stomach and to the left kidney and perisplenitis are found frequently. Either due to necrosis of the splenic tissue which stimulate the proliferation of the omentum, or through the direct toxic action of the Brucella organisms a covering, with a fixed organic structure or a coating of fibrinous material, forms on the spleen. In advanced cases the fibrinous covering becomes so thick that the spleen looks as though it were strangulated. The lesions found in or around the spleen are so characteristic that they should be recognized as specific changes.

Contrariwise, when a sublethal dose had been given, there was definite splenauxe——even a typical splenomegaly was found in the rats. This occurred also when the pathogenic power of the organisms used in the inoculation was lowered by a small dosage of a serum endowed with protective activities or through a large dose of apparently normal serum.

In chronic cases cachexia, anemia and emaciation are found.

Effects of Sex

The preliminary observation that the female rats died earlier than the males was confirmed by a retrospective scrutiny of the necropsies and bacteriological examinations by which we were enabled to trace the sex and to gather precise data for 141 (81 male and 60 female) inoculated rats. Of the 81 males, 28 (34.6%) survived the disease and 53 (65.4%) succumbed, on the average, 3.6 days after inoculation. Of the 60 females that had been inoculated with the same *Brucella aborus* suspensions, only five (8.3%) survived while 55 (91.7%) succumbed to the infection after an average post-inoculation period of two days. After the consideration of the foregoing data in February, 1945, it was decided to take cognizance of the sex composition in the selection of experimental groups of rats. In all tests performed subsequent to this, the lower resistance of females to intraperitoneal inoculation of Brucella was confirmed. It was found that the lethal dose for females was one-half to one-third that required for males.

We then realized the importance of taking into account the sex-factor to obtain uniform results in the research then under way. At first groups including females and males were used in our tests; later male rats were used exclusively; and eventually groups of males and females again, the latter being given only one-half the number of organisms given to males.

To determine the influence of age, a few tests were made which indicated that older adult female rats (weight 300gm-400gm) are particularly susceptible. Seven adult female rats used for breeding were given an injection of the M.L.D. (about 4000 million Brucella organisms) of our virulent strain. They all died within 24 hours; that is, in a shorter period than the young female rats, in which the average interval between intraperitoneal inoculation of 4000 millions Brucella organisms and death had already been determined to be between two and three days.

Comment and Conclusions

From our knowledge of the different reactions of the two sexes to mineral and organic drugs or poisons, there is no basis whatsoever for presuming that the female rat is as a rule less resistant than the male. However no comparative investigation has thus far been carried out to discover whether the two sexes react in different ways when artificially inoculated with pathogenic organisms, such as molds, microbes or viruses. To my knowledge, experimentation with other laboratory animals along this line is also scarce. Henry Traum and Haring[1], found a prevalance of positive urine cultures among the males in lots of guinea pigs which had been inoculated with milk drawn from cattle affected with brucellosis. From their experiments, aimed at investigating the relation of sex to the course of tubercular infection in mice, Long and Vogt[2] came to the conclusion that, in some way, ovariectomy was protective and estrus harmful. Estrin treatment which lowered the resistance of ovariectomized mice in Long and Vogt's tests was found by Aycock[3] to increase the resistance of female castrated monkeys to poliomyletis. It is impossible to draw any conclusions as to the factor or factors involved since castration seems to delay the evolution of tubercular infection in both male and female guinea pigs[4]. Furthermore both male and female mice were rendered highly resistant to inoculations of hemolytic streptococci when given a single dose of estrogen[5].

It remained to be seen whether the estrus cycle had any effect on the susceptibility. A study of this problem will be reported later.

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Diagnosis of Internal Parasites of Sheep*

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THE direction of efforts for the control of sheep parasites has in many areas passed from veterinarians to drug salesmen. This has been in part the fault of the veterinarians themselves. The discovery of the anthelmintic value of phenothiazine with the commercial exploitation and exaggerated claims for this parasiticide created an impression among sheepmen that an occasional treatment with phenothiazine will remove all of the troubles due to parasitism in their animals.

A second and more important reason that sheep parasite control became less interesting to the veterinarians was the increase in the numbers of parasites and the wider distribution of the various species. Perhaps owing to the pressure of work during the war years a considerable number of veterinarians did not familiarize themselves with the changing type of parasitism and do not now appreciate the need of continuous action to keep ahead of the parasites.

The diagnosis of parasitism frequently requires laboratory facilities or very keen field observation. Diagnosis is a prerequisite of properly formulated plans for control of parasites. It is the purpose of this report to describe briefly the technic employed in this laboratory for determining the species of parasites present and obtaining counts of the numbers in the various segments of the digestive tract of sheep.

Parasitism is usually diagnosed by (1) the fecal count of ova and (2) by the post-mortem examination of the sheep. There are certain advantages as well as disadvantages to each method and whenever possible a combination of the two is employed.

One advantage of the fecal count method is that a large number of samples can be obtained and examined in a relatively short time. This gives a better sampling of the flock and does not require killing any of the animals.

Disadvantages of the fecal count method are: (1) the failure to find ova in the feces of some heavily parasitized sheep, (2) many of the anthelmintics used in salt licks have a decided inhibiting action on the production of ova by the worms. Thus negative fecal counts may be obtained as a result of anthelmintic treatment that has not materially decreased the parasite load, (3) the parasites may be extremely numerous and cause death losses in some cases before they have reached the stage of maturity where they are depositing ova, (4) in cases of severe diarrhea the feces may be so fluid that the number of ova per gram may be small although the actual number eliminated per day may be very large and (5) as Mayhew[1] has observed a greater consumption of feed has the same dilution effect as diarrhea on the concentration of ova.

Post-mortem examination has the advantage of giving the diagnostician a chance to observe the entire carcass and to note any pathologic changes that may or may not be due to parasitism.

Disadvantages of the post-mortem examination are: (1) unsuitable carcasses submitted for examination, (2) lambs very weak from the effects of parasitism often have secondary gastritis and enteritis, but at the time of death few if any parasites are found, (3) many heavily parasitized lambs, which are suffering also from malnutrition, often eat large quantities of sand and other foreign material. A secondary gastroenteritis, produced by this foreign material, may completely mask the effects and the presence of the parasites, (4) post-mortem examination usually requires the sacrifice of one or more animals and (5) the condition of many animals must be deduced from the lesions found in comparatively few members of the flock.

In order to make a flock diagnosis we recommend the following procedure for the collection of fecal samples: The sheep are examined and likely looking individuals selected, including those showing diarrhea and emaciation and those showing no evidence of either. This may be done. either by driving them through a chute or by penning small groups with panels. Feces collection bags are attached to the individuals selected.

The collection bag, as illustrated in Fig. 1 is so made that straps A and B pass up on each side of the rump and strap C goes between the hind legs. The rope is passed through strap C and the bag placed in the middle of the rope. The two ends are then passed between the hind legs and up around the flanks where they are held with one hand while the bag is placed over the tail. The rope is then placed through straps A and B and the bag adjusted in position and the ends tied in the middle of the back as shown in Fig. 2.

The bag is made of nonwater-proofed canvas with loose stitching at the apex of the cone so that urine will drain away. The bags can be put on by a single operation and removed as soon as the sheep defecates (Figs. 2 and 3).

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An advantage of the bag collection of samples over picking samples from the ground is the absence of free living, non-parasitic larvae in the samples and the elimination of the possibility of picking up old pellets in which the larvae have already been freed.

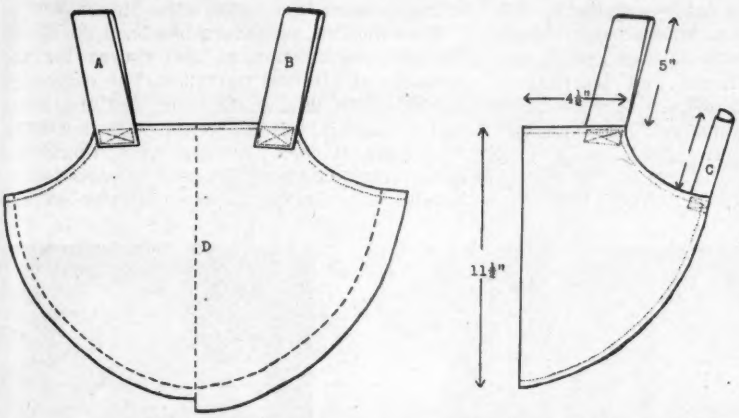

Fig. 1. Pattern of collection bag. The upper edge is hemmed and straps A and B stitched on. The bag is folded on line D and stitched on the lower curved edge with the wider seam allowance folded over the other. Strap C is then stitched directly over the seam

It is desirable even in range sheep to mark the sheep with a number brand and use the same number to identify the sample. If the samples are to be examined within five to eight hours they need not be removed from the collection bags before transporting them to the laboratory. If the time that lapses before examination will be more than eight hours it is best to transfer the sample to a waxed carton (Fig. 3), such as

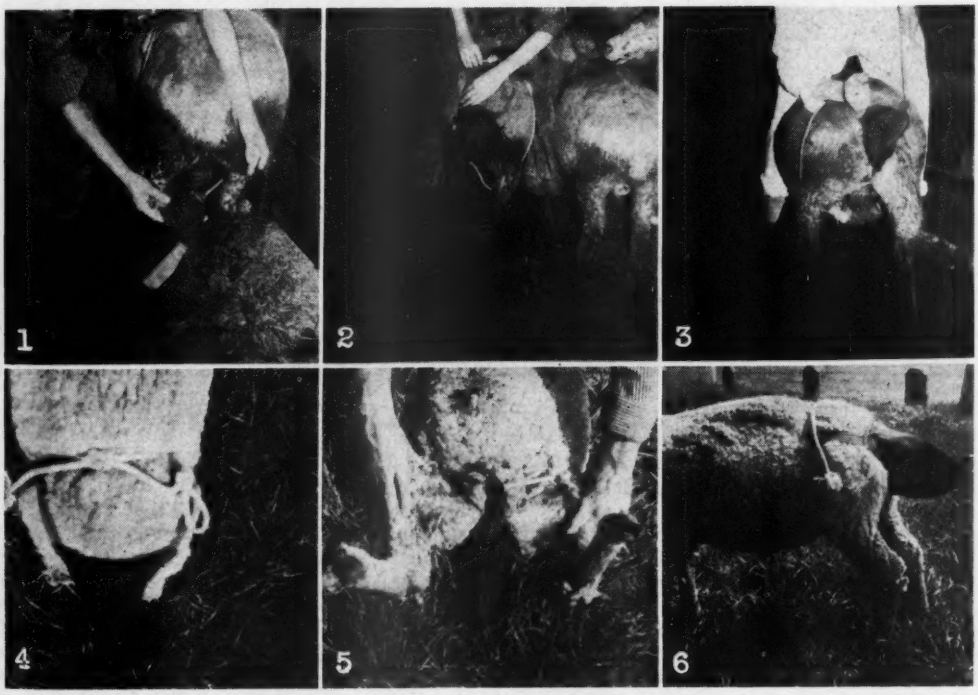

Fig. 2. The collection bag. 1, Placing the collection bag between the hind legs with the rope around the flanks; 2, placing the collection bag over the tail in preparation to slipping the rope through the two rump straps; 3, pulling the collection bag into position by tightening the rope around the flanks and tying with a square knot; 4, position of collection bag, dorsal view; 5, position of collection bag, ventral view; 6, position of collection bag, lateral view

a small ice cream carton and then quick-freeze the sample. If a large number of samples is to be collected the bags may be turned inside out and used twice before washing.

Fecal counts can be made rapidly by the Whitlock[2] method. With practice the identification of the ova of the various genera can be made. The photographs and descriptions given by Kates and Shorb[3] are very useful in learning to identify various ova. Fresh samples must be examined within eight hours or some of the ova will rupture and free larvae. Frozen samples may be kept indefinitely, but after they have thawed out they must be treated the same as fresh samples.

If it is found that the ova have ruptured, it is then necessary to use a Baermann's apparatus and a subsequent count of the larvae. We have not considered the larvae count to be as satisfactory as the ova count. It is usually necessary to count both the larvae and the ova as some of the latter will not have ruptured and freed the larvae. In all cases it is advisable to make the ova count even though larvae are present.

Samples have been submitted from all parts of this state in our parasite surveys. When the feces were frozen first, and packed with ice the ova have usually not embryonated on arrival. This, of course, does not apply to the Strongyloides, in which free larvae may be found in about five hours after the collection.

The following procedure has been developed for the examination of the viscera for the presence of internal parasites. The carcass is opened by a median incision and the lungs and abdominal viscera removed intact (Fig. 4). Pieces of cord are then tied around the omasum near its juncture with the abomasum, around the dudenum just posterior to the pyloric sphincter, around the ileum near the ileo-cecal valve and around the rectum near the anus. If the examination is to be made immediately, it is not necessary to use the cords to prevent the mixing of the contents of the various segments. If it is necessary to transport the specimen very far it should be either frozen or preserved with formaldehyde. If formaldehyde is used an injection of 5 to 10cc of commercial formalin into the abomasum and three or four injections of 5cc into various parts of the intestines will preserve even the larval parasites. The entire specimen should then be submerged in 5% solution of

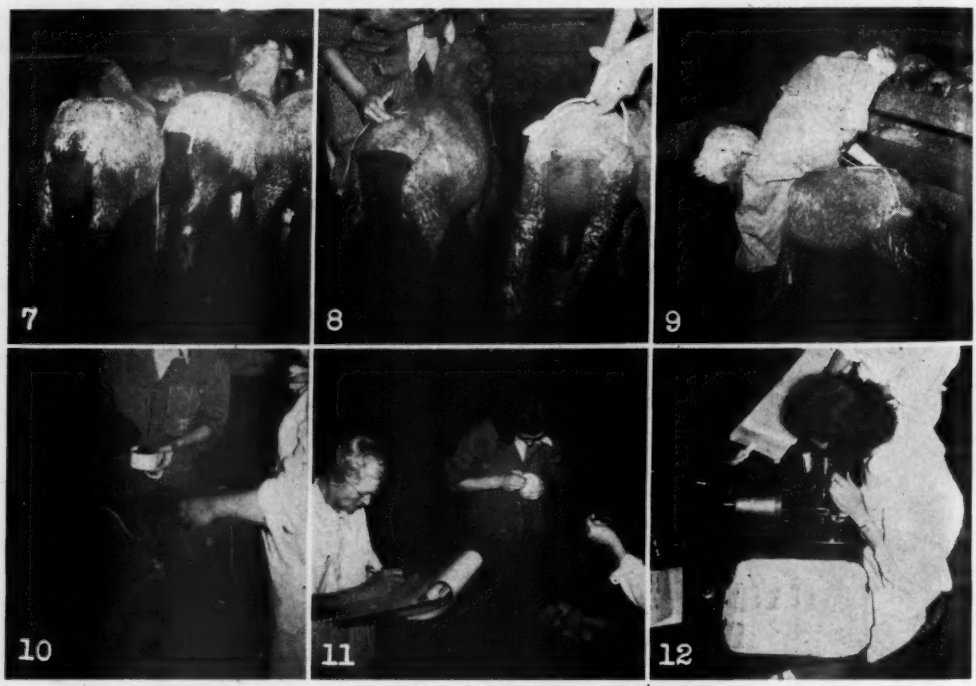

Fig. 3. Collection of the feces. 7, 8, and 9, Filled collection bags ready for removal by untying the knot over the rump and pulling the bag, posteriorly so that the rope slips out of the rump straps; 10, emptying collection bag into a waxed carton; 11, labeling carton; 12, counting ova

formalin. Samples that have been quick-frozen and stored, have, when thawed after four months, handled as well as fresh tissue. The parasites also are intact.

When the specimen is to be examined, it is placed in a large tray 58 x 30 inches and 6 inches deep so that if breaks occur the fluid

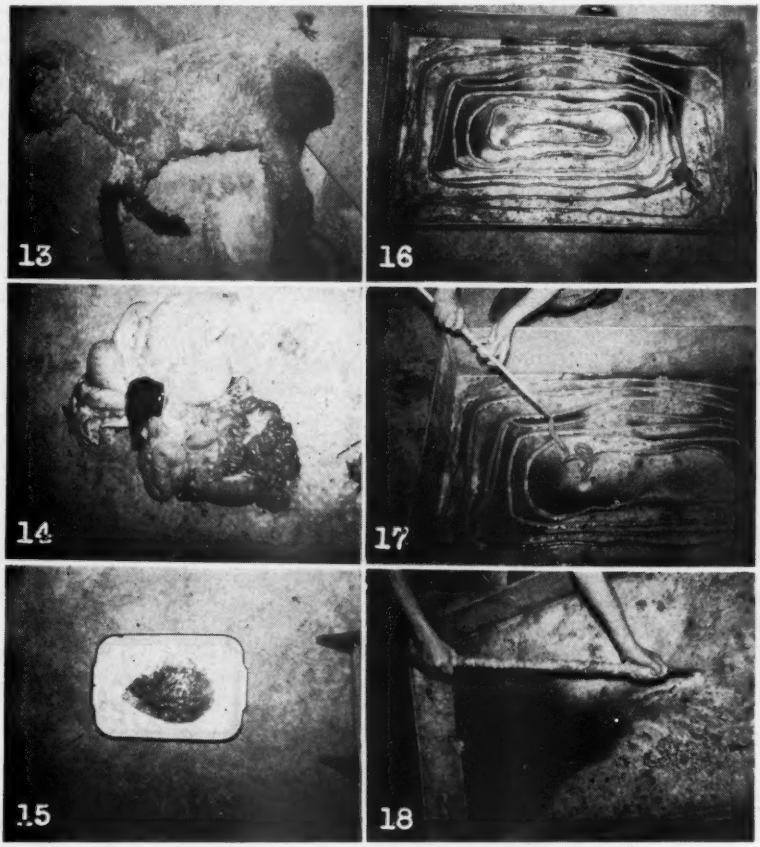

Fig. 4. The various steps in the post-mortem examination of a parasitized lamb. 13, Parasitized lamb; 14, internal organs removed intact for examination; 15, opened and washed stomach; 16, small intestine placed in autopsy pan; 17, small intestine slipped over scraper of enterotome*; 18, complete length of intestine slipped on the enterotome* ready to be pulled across knife blade*

will be salvaged for the final parasite count. The abomasum is first cut from the intestines and opened and turned inside out (Fig. 4). If the tissues are fresh many of the parasites will be adherent to the mucous membrane. If, however, the tissues have been frozen, most of the parasites will be mixed with the ingesta. The inside of the abomasum is then thoroughly scrubbed and the washings added to the ingesta. The combination is then made up to a convenient volume and an aliquot taken for identifying and counting the parasites. If only a few parasites are observed it is often best to let them settle to the bottom of the mixture and discard the extra water. The aliquot taken from the stomach washing can be conveniently examined under a dissecting microscope, so that counts can be made of mature and larval forms.

The cecum and large intestine is next separated from the small intestine by severing the ileum at the ligature and using blunt dissection to separate the two segments. It is usually simpler to examine the small intestine first. If care is used the entire small intestine can be stretched out without breaking. If it breaks it is of no consequence because the contents are caught in the tray in which the dissection is made (Fig. 5). When the intestine is freed from the mesentery, the cords tying the ends

*This is a model in the early stages of development with a very small knife. It has been found that the enterotome shown in figure 5 is more satisfactory.

are removed and the ileal end placed on the scraping and splitting device. This piece of apparatus is a ¾-inch pipe 40.5 inches long. One end is threaded so that a nozzle with a shoulder for holding the scraper (a washer) can be screwed in. The other end of the pipe is connected to a water supply by means of a hose (Fig. 5). The washer is large enough to stretch the intestine and scrape the mucous membrane. Washers of various sizes may be used to accommodate both large and small intestines and the intestines of sheep of different ages. A small amount of water flows from the nozzle and aids in washing the parasites free from the intestine. The intestine is then pushed up the pipe until it has all passed over the scraping washer. The end is then grasped and pulled against the splitting knife which cuts the intestine so that it falls from the pipe. The entire contents and washings go into the tray which is placed on a slant so that it drains into a container from an opening, one inch in diameter, in one corner. The split intestine is then washed to free any adhering parasites and the fluid is measured. A coarse sieve is used to remove the tapeworms which are then weighed and the quantity expressed in grams. The contents and washings are then mixed and an aliquot taken for identification and counting of the parasites. The addition of about 2% sodium bicarbonate dissolves much of the mucous and makes larval forms more clearly seen.

The large intestines may be opened in the same manner as the small intestines, although it is often easier to open them by use of an enterotome scissors and pick the parasites from the mucous membrane with forceps. If the sample has been frozen many of the Chabertia will migrate toward the center of the intestine and will be found mixed with the fecal material. At the time the rectum is opened a 10gm sample of fecal material can be taken for an ovum count. The contents are then suspended in water, strained through sieves of decreasing sizes and the various parasites removed for identification and counting. In general it is desirable to count the parasites in the large intestine individually, unless they are extremely numerous, since the large worms settle out of the mixture of water and intestinal contents rather quickly an aliquot may not contain a representative sample.

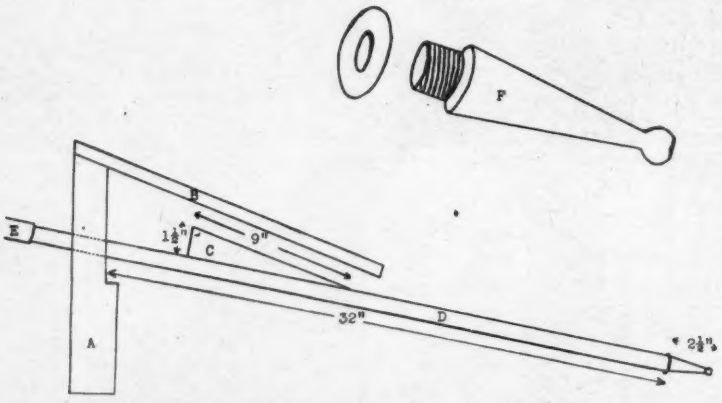

Fig. 5. Mounted enterotome. A, Block for clamping enterotome in place; B, guard; C, knife; D, enterotome pipe (¾" diameter); E, rubber hose; F, anterior end of enterotome with scraper

The bile ducts are opened with enterotome scissors and an examination made for tapeworms and flukes.

The bronchi and bronchioles are opened and a gross examination made for the large lung worms, *Dictyocaulus filaria*. When looking for small immature *D. filaria* compression slides may be prepared and observed under a dissecting microscope.

The complete examination of the viscera of a sheep by the method described is not a long procedure and the advantages of it are numerous. The total number of worms is learned and the importance of the various species may be estimated. If diseases other than parasitism are present, they will be found.

The drawings and descriptions given by Underhill,[4] Mönnig,[5] Ransom,[6] and Freeborn and Stewart,[7] are of value in the identification of the parasites. Swales[8] has collected various data which may be used for the estimation of the numbers of parasites of the different species that are considered as being harmful to a sheep. These numbers are:

	Individuals
Haemonchus contortus	more than 500
Ostertagia circumcinta	more than 8000
Trichostrongylus sp.	more than 10000
Cooperia curticei	more than 10000
Chabertia ovina	more than 100
Oesophagostomum columbianum	more than 100

Data are lacking as to the number of Nematodirus that should be considered harmful. This species appears to be relatively nonpathogenic and is usually found associated with other more harmful species.

Since tapeworms are usually broken into many segments during the autopsy, it has been found convenient to weigh them and express the weight in grams. We have encountered no pure infestations of tapeworms. One fringed tapeworm located in a bile duct would cause the condemnation of the liver and from the packers standpoint would be harmful. We consider Moniezia infestations, exceeding 25gm per lamb to be harmful.

In a close examination of dilute stomach and intestinal contents, it is frequently possible to detect large numbers of larval forms of nematodes that may be very serious, but which escape detection unless magnification is used in examining the samples.

Examination in the field for parasitism of sheep is often more difficult than in the laboratory. It is usually relatively simple to find Haemonchus in the abomasum, but if immature Ostertagia and the trichostrongyles are buried in the mucous membrane, they readily escape detection, unless the inside of the abomasum is examined under good light with the aid of a magnifying glass. In the small intestine Trichostrongylus, Capillaria and Strongyloides are found, which may be invisible to the naked eye. In freshly killed sheep the intestinal contents may be diluted with warm water and the mixture observed for small, moving nematodes. If numerous parasites are found, the diagnosis is made of parasitism without the necessity of identification.

If, however, parasites are not found in the contents of the small intestine, the mucous membrane should be examined carefully with a magnifying glass under good light. If the sheep has been dead for some time the small parasites may be digested and it will be impossible to find them, even though they may have been the cause of the death of the animal.

Acknowledgment

The authors wish to express their thanks to Miss Ada Marie Campbell, NDAC Dept. of Home Economics for aid in preparation of Figure 1, and to Mrs. Nora Edhlund, Miss Pat Campbell, Miss Margaret Frances Eveleth, and Mr. Hugo Schneider for aid in developing the apparatus and equipment used in the methods described in the foregoing.

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Clinical Reports

Fibroid Tumor in a Chow

A chow bitch, said to be two years of age, was presented September 27, 1945, for treatment. There was a reddish-brown mass protruding from the vulva which upon digital palpation disclosed a pedunculated tumor extending to a point beyond that which the finger could reach. The dog was apparently normal in all other respects.

A routine spaying operation was performed under ether anesthesia. With the patient confined in dorsal recumbency, an incision three inches long was made in the median line posterior to the umbilicus after preparation of the area by shaving, painting with tincture

of iodine and applying an antiseptic-pack of alcoholic sublimate. To remove the tumor an assistant gently forced the mass through the vulva and anteriorly as far as was practicable. The ovaries, uterus and the tumor in the vagina were then removed in the usual manner with a ligature on the vaginal stump. The operation was uneventful except for localized adhesions between the vagina and bladder which were torn in removing the genitalia.

The neoplasm consisted of a large, firm, reddish-brown, egg-shaped mass (A) two inches long and one and one-half inches wide. From the apex a stalk (B) three-fourths inches wide and two and one-fourth inches long led to the ventral wall of the vagina. This stalk was hollow and lined with serosa —apparently an invagination since a probe could be passed from point (C) posteriorly through the center of the stalk to the apex of the mass. Concentric to this was a longitudinal cavity of typical uterine mucosa.

The cervical canal was partially occluded permitting access to the pregnant horn only (D), which contained a fetus one and one-fourth inches long.

Another hemispherical tumor (E) three-quarters inches in diameter was on the lateral surface of the vagina.

The patient died two days post operative after showing severe toxic symptoms. The treatment employed was sulfathiazole *per os*, blood transfusion and saline and dextrose solution intravenously. A sodium bicarbonate enema a day before death had removed chicken heads, feathers, feet, sausage casing and similar garbage.

Post-mortem examination showed a catarrhal gastroenteritis and a large subserous hemorrhage four inches long on the ileum. The liver was gritty on cutting and appeared severely cirrhotic. However on microscopic examination only marked fatty degeneration could be seen.

The tumors microscopically were composed largely of fibrous tissue however Feldman (Neoplasms of Domestic Animals, p. 161) states: "Although connective issue may sometimes equal or exceed in amount the myomatous elements present—particularly in cases of long standing never-the-less, the neoplastic process involves fundamentally the smooth muscle cells which are the elements concerned in the inception of these tumors."

It might be added that, although the dog was described as being two years of age, there was some doubt as to the age. There was considerable wear of the teeth which would indicate a much older animal.

ISAAC LEVINE

Brooklyn, New York

* * * *

Supra-Inguinal Hernia in a Dog

History.—A four-year-old, male pointer was brought into the clinic Nov. 24, 1945. The dog was in fair condition and showed no symptoms other than a swelling beneath the skin medial to the fold of the right flank and lateral to the penis. This swelling was two and one-half inches in diameter and one and one-half inches in depth. It appeared to be the result of traumatism by a short cornstalk while the dog was being used for hunting the day before.

Diagnosis.—Upon palpation an aperture was

found which was one inch in diameter through the muscles of the area. Through this opening a loop of the small intestine had escaped and was confined just beneath the skin. A diagnosis of a inguinal hernia due to trauma, was made.

Treatment.—The dog was placed in dorsorecumbency, the skin over the hernia was shaved, thoroughly scrubbed with soap and water for five minutes, rinsed with water and painted with tincture of iodine; then a pack of alcoholic sublimate was applied for five minutes. The dog was anesthetized with ether and an incision, two inches long, was made

The inguinal swelling due to a severe trauma, which tore the muscles apart without breaking the skin

through the skin into the hernial sac. The small intestine was returned to the abdominal cavity and the ruptured peritoneum sutured with 10-day, chromic catgut using a continuous suture. The muscle layers of the area were separated. The two edges of the obliquus abdominis internus were then lapped over each other (lateral edge over medial) for a distance of one inch and then sutured together using three interrupted sutures of 20-day chromic catgut. The medial edge of the obliquus abdominis externus was lapped over the upper layer of the obliquus abdominis internus and similarly sutured. Then the remaining edge of the obliquus abdominis externus was lapped over the previous layers for one inch and sutured in the same manner. The edges of the transversus abdominis were lapped (medial edge first) and sutured as the previous muscles were. The skin incision was closed with three mattress sutures of linen, and sulfanilamide powder was dusted upon the wound.

The skin sutures were removed in five days. The dog made a complete and uneventful recovery.

D. M. TROTTER

Dawson, Minnesota

Chronic Endocarditis and Hypertrophy of the Heart

December 6, 1945, a five-year-old, male, Irish wolf hound was presented for treatment for a general enlargement of the abdomen. The owner had noticed the condition about a week previously. The dog stopped eating and began to lose condition rapidly.

The various prominences of the skeleton were very much accentuated. The temperature was 101.6°F., and during the following seven days it remained about the same.

Provisional diagnosis: Ascites due to some circulatory disturbance.

Prognosis: Unfavorable.

Symptoms: On observation and palpation of the abdomen there was a distinct ascites and the animal's face was slightly swollen. An attempt to take the pulse in the femoral artery was futile, due to its weakness and irregularity. On listening to the heart with a stethoscope, the heart was pounding heavily; also a swishing sound could be heard. A fecal examination revealed some *Ancylostoma caninum* eggs.

Therapy: Treatment was started with B and iron tablets 25 grains; 2cc aminophylline intravenously (for rapid stimulation); 25% dextrose solution enema, and the ventral area of the abdomen was shaved and prepared for abdominal paracentesis. About a gallon of liquid was withdrawn.

December 7. The dog appeared to be improved and began to eat his ration. Swelling of face disappeared, but there appeared a submaxillary edema and swelling on chest area and in the scrotum. No change in heart rate was noticed.

Treatment: Aminophylline intramuscularly 2cc; and fluid extract digitalis, 10 minims via capsule.

December 8: The animal showed no change. Previous treatments were continued.

December 9: The submaxillary edema disappeared; no change in heart rate or other symptoms.

Treatment: Atropine sulfate 1/50 grain; aminophylline 2cc; fluid extract digitalis 10 minims. The stimulants were to be given three times a day.

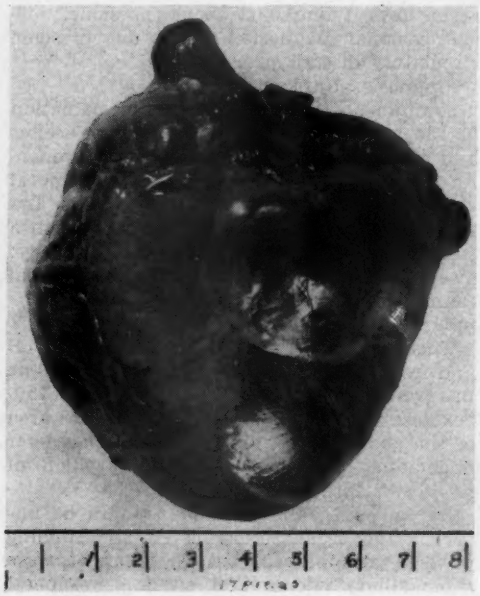
December 10: The animal appeared the same, except that the left hind leg appeared stiff. Blood was drawn for a Diroflaria examination and it was found to be negative. Previous treatments were continued, except for the atropine sulfate which was discontinued.

December 11: The left hind leg was markedly edematous. The abdominal ascites appeared to be returning. The dosage of digitalis was increased to 15 minims.

A blood sample was taken for a total nitrogen determination (modified Kjeldahl). The reading was 4.7 which was very low. The dog's appetite remained good all the time since treatments were started. Large amounts of protein supplements were being fed daily.

December 12: No change in animal's condition except for an appearance of depression.

Treatment: Aminophylline 2cc; dextrose



20cc of 25% intravenously; normal serum subcutaneously 50cc; 20 minims of fluid extract digitalis. Massage of the leg.

Urine analysis at this time gave the following:

Color—deep amber
Odor—putrid
Specific gravity—1.42
Litmus—acid
Ketone bodies—negative
Albumen—negative
Microscopic for casts and cells—negative

December 13: The dog did not eat his ration; appearing very depressed.

Treatment: Leg massaged; 20 minims of fluid extract digitalis in capsule.

December 14: Patient appeared very depressed. Euthanasia recommended.

Post-mortem examination: On opening the abdominal cavity three or four gallons of fluid escaped. There was a little fluid in the thoractic cavity and in the pericardial sac. The spleen appeared slightly atrophied. The liver was friable. On examination of the heart it was found to be as large as a bovine heart and round as a ball with no apex. The measurements were approximately 8 by 8 inches. It weighed 870 grams with all blood removed. On opening the heart the walls of the left ventricle was about ⅛ inch thick at the thickest part and paper thin in other areas. The entire wall of the right ventricle was paper thin. The bicuspid and tricuspid valves were both perforated and the edges were thickened considerably with structures present.

Diagnosis: Chronic endocarditis and hypertrophy of the heart.

Etiology: Not known, but a suggestion was made that the condition could have been caused by a previous infectious disease such as canine distemper. A curious fact is that the owner who raises Irish wolfhounds has had other dogs die of greatly enlarged hearts.

ROY NAGAKURA

Hilo, Hawaii

Mastitis Complicating Milk Fever

December 10, 1945, we received a call to attend a five-year-old Guernsey cow, suspected of having milk fever. The first observation made was, that the facilities available were entirely inadequate for productive animal husbandry. The ailing cow was in an advanced stage of emaciation. By casually observing the other members of the herd it appeared that malnutrition was general among the group. Prairie hay and a small amount of grain seemed to be the only feed available for the cows.

This cow had been bred to a Hereford bull and had given birth to a strong, viable, white-faced calf four days previously (December 6). According to the anamnesis furnished the parturition had been normal and the fetal membranes were expelled promptly.

The patient revealed symptoms of parturient paresis; extreme weakness, slight generalized trembling, marked kyphosis, and cold extremities. However, she was able to rise to her feet and stand for a short period.

Treatment consisted of 500cc of 20% calcium borogluconate, given intravenously and 500cc of a 25% solution of dextrose given in like manner. She was moved to a shed and bedded down to protect her from the inclement weather.

The most unusual aspect of this case was noted when further examination of the patient revealed an acute localized mastitis as a complication of the milk fever. The simultaneous appearance of these two conditions seems to be a rare combination in veterinary medicine.

The left rear quarter of the udder was swollen and highly inflamed. Milk samples were aseptically collected from each quarter. The secretion from the affected quarter was very watery and contained characteristic coagulated masses. The samples were incubated, and the stained smears were examined microscopically. Long chains of *Streptococcus agalactiae* were revealed. No pathogenic bacteria could be found in the samples from the other three quarters.

Parasitism was considered as a possible contributing cause of the severe emaciation; however, a fecal examination for parasite ova was negative.

The day following treatment, the owner informed us that the cow was much improved, and he was given advice relative to the care of the udder. Without further contact with the owner it was assumed that the patient had recovered; however, December 21, 1945, he stated that the cow had died and requested a necropsy. Post-mortem examination revealed the presence of approximately two liters of purulent exudate in the uterus, and a diagnosis of septic metritis was recorded as the immediate cause of death.

Long chains of *Streptococcus agalactiae* were revealed

Recorded cases of the simultaneous occurrence of milk fever and mastitis seem to be very few in number. This case added a third serious ailment—septic metritis.

MYRON C. KROMMINGA

Centerville, S. D.

Age a Factor in Anaplasmosis

Anaplasmosis is a disease of great economic importance to the cattle industry in the states where it occurs. Although young animals may have anaplasmosis they seldom present the severe clinical picture usually seen in mature animals. There have been some reports by ranchers and by a few veterinarians to the effect that in some herds severe losses have occurred in animals between the ages of one and two years. In the majority of such instances, the diagnosis was not confirmed by either microscopic examination of the blood or by inoculation of the blood from the dead animals into adult susceptible animals.

While conducting our work[1] under range conditions, we became interested in determining how many calves, nursing cows with clinical anaplasmosis (that we treated for the disease) would show parasites in their blood. Following treatment of the dams we had the cowboys rope their calves so that we could obtain blood samples even though the calves showed no clinical symptoms of the disease.

In three of 198 cases we were able to find marginal bodies in properly stained blood smears.

On the ranch where this work was carried on, the owner had marked each animal with a "year mark" on the jaw. This was a burnt brand and was easily found upon examination. Following treatment of a sick animal, the age was recorded along with the general record which we kept on each animal examined. In accordance with these records, the ages, number of animals and the percentages are shown in the following table:

TABLE I.—AGE AND INCIDENCE OF ANAPLASMOSIS

Ages in years	2	3	4	5	6	7	8	9	10
Number of cows that developed anaplasmosis	2	5	10	18	60	34	17	44	8
Number of cows in each age group				750	400	300	100	100	50
Percentages affected				2.4%	15%	11%	17%	44%	16%

As a result of this study we concluded that the age of the animal is a factor in the incidence of clinical anaplasmosis.

Reference

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H. C. SMITH

Sioux City, Ia.

D. E. HOWELL

Stillwater, Okla.

Chronic Fluorine Intoxication: Effect on Bones and Teeth

Much experimental and clinical work has been done on the effect of chronic fluorine intoxication on teeth, but little attention has been paid to the changes in the bones.

Wilke has observed in roentgenograms very distinct bone changes, due to chronic fluorine intoxication, in two workmen from an aluminum fluoride factory in England. Tooth changes in these cases were not present, since the victims had been exposed to the excessive amount of fluorine, only as adults. Chronic fluorine intoxication, as is well known, affects only tooth buds. The erupted teeth then show the well-known lesions of "mottled enamel."

These cases of bone involvement, due to chronic fluorine poisoning, resulted from the inhalation of gaseous fluorine compounds. However, most of the cases of epidemic chronic fluorine intoxication in man and animals are due to ingestion of food containing harmful amounts of fluorine compounds or, more frequently, by drinking water with a higher percentage of fluorine than normal.

Men and animals in Algiers, Tunis and Morocco were exposed to a high fluorine content of drinking water at an early age, when the teeth were developing and the bones growing. The chronic fluorine intoxication affected the teeth and also the bones of the extremities, skull and jaws. The occurrence of tooth and bone involvement at the same time has been proved by experiments on rats, pigs, sheep and calves. The teeth revealed the characteristic changes of mottled enamel first described in detail by McCollum, Simmonds, Becker and Bunting. There is no uniformity of opinion as to the nature of the bone lesions. Some authors report a rickets-like systemic disease; others deny the presence of abundant osteoid tissue but do not hesitate to speak of a "generalized condition resembling osteomalacia."

Bauer, in a recent study attempts a clarification of the nature of the skeletal changes in chronic fluorine intoxication and their correlation to tooth lesions. He wished to learn (1) whether chronic fluorine intoxication affected the skeleton of dogs, (2) If vitamin D added to the fluorine diet would alter the changes of the bones and teeth, (3) If the bone changes start before, simultaneously with, or after, the tooth changes begin and whether or not fluorine is excreted with the bitch's milk, and (4) if it affects the bones of puppies. Sixteen dogs of three litters were used in his experiment.

The dogs, placed in separated spacious rooms with good sunlight, were kept as much as possible in the open air in the daytime. The puppies when fed a fluorine diet generally reacted with symptoms of indigestion for the first four or five days, but regained their appetites and liveliness quickly. Thereafter the experiments remained undisturbed. The dogs were killed by severing the carotid artery under ether.

At autopsy, the endocrine glands, the kidneys, and the following bones of the experimental and control dogs were removed: the long bones, ribs, jaws with the teeth, vertebrae, and parts of the skull. The bones were examined roentgenographically, decalcified in 5% nitric acid, embedded in celloidin, sectioned and the sections stained with hematoxylin and eosin.

The radiographic examination of the bones of the dogs exposed to fluorine revealed a systemic involvement of all bones, with a distinct predilection for the long bones, jaws and vertebrae. There was a thickening due to massive periosteal bone formation, superimposed upon the old cortex. A fairly sharp boundary against the compact bone was preserved. The new periosteal layer on all bones appeared extremely wide and was particularly pronounced at the insertion of muscles. While the contours of the thickened bones of the dogs of the first group and of the dam of the third group were sharp, the bones of the fluorine puppies showed blurred outlines. The spongy part of their bones revealed a distinct osteoporosis. The medullary cavities of the bones of the dam appeared narrowed by endosteal osteosclerosis. Among the bones most involved by periosteal thickening and endosteal osteoporosis, the jaws occupied a prominent place. The radiographic examination of the jaws which contained the buds of the permanent teeth demonstrated, besides the bone changes, a very distinct change of the hard tissue of the tooth buds as compared with the controls.

The gross examination of the bones of the dogs on the flourine diet revealed a striking thickening. Their surfaces appeared rough, uneven and chalky. The cut surfaces of the bones, which were sawed in two in the axis, showed that the thickening was due to an excessive periosteal bone formation, while the original cortex was thin. The consistency of these thickened bones differed remarkably. The bones of the dam were extremely hard, those of the first group were rather brittle, those of the second group could be, with some difficulty, cut with a knife, whereas the bones of the puppies of the third group were so soft that they were bent and cut easily. The eruption of the permanent teeth was considerably delayed in all dogs on the fluorine diet. In puppies fed exclusively the milk of their fluorine-poisoned mother, changes of the bones

TABLE No. 1.—SKELETAL CHANGES IN CHRONIC FLUORINE INTOXICATION AND THEIR RELATION TO TEETH LESIONS

Dog	Diet	Daily supplement of sod. fluoride in basal ration (grams)	Age at start of experiment (days)	Weight at start of experiment (grams)	Age at death (days)	Days on diet	Weight at death (grams)	
1 Male Control	Control Normal diet; rye bread, meat, milk; later plenty of bones	0 Control	98	4,500	194	Control	14,500	Group 1
2 Male	Normal food	0.2	98	5,000	194	96	10,500	
3 Male	Normal food	0.1	98	5,500	194	96	12,500	
4 Male	Normal food	0.1	98	5,000	194	96	11,700	
5 Male	Normal food and cod-liver oil and salt mixture of Osborne and Mendel	0.1-0.2	47	3,400	117	70	6,300	Group 2
6 Male	Same as No. 5	0.1-0.2	47	3,150	122	75	5,400	
7 Female	Same as No. 5	0.1-0.2	47	2,700	121	74	5,000	
8 Female	Same as No. 5 Control	0 Control	47	2,700	122	Control	8,700	
9 Female	Normal food and cod-liver oil and salt mixture of O. & M.	0.4	330	11,500	670	340	14,500	*
10 Male	Suckled by fluorine-poisoned dam No. 9				28		1,350	Group 3
11 Female	Suckled by fluorine-poisoned dam No. 9				28		1,360	
12 Female	Suckled by No. 9 for 28 days, then fed normal food	0.1	28	1,300	156	128	3,300	
13 Female	Same as No. 12	0.1	28	1,400	57	29	1,730	
14 Male	Same as No. 12	0.1	28	1,300	95	67	2,500	
15 Male	Same as No. 12	0.1	28	1,300	74	46	2,700	
16 Male	Same as No. 12 Control	Control 0	28	1,100	156	Control	8,000	

*Had a litter of 7, following 156 days of sodium fluoride administration. Received 62.4 grams of sodium fluoride throughout the 156 days.

were observed prior to those of the tooth buds.

The fact that, in experimental fluorosis, the changes of bones and developing teeth could not be prevented nor alleviated by an antirachitic, diet, and calcification of a startling amount of periosteal and endosteal bone occurred during continued administration of fluorine, suggests that the pathogenesis of the bone and the tooth lesions in rickets and in fluorosis differs. The enzymatic and protoplasmic action of fluorine produced rickets-like changes in bones and dentine of puppies, but its effect upon bones and tooth enamel of older dogs differed from rickets.

These experimental studies and recent observations of dental fluorosis associated with bone changes indicate the necessity of a thorough roentgenographic examination of the skeleton of children and animals showing "mottled enamel" in fluorine areas in this country.—H. J. MOSTYN.

Time Savers

Two simple ideas have saved us a lot of embarrassment.

One is cutting the end of our stomach tubes on a slant, like a hypo needle, and keeping the long side on the floor of the nasal passage. One winter we administered carbon disulfide to 512 horses and mules, almost entirely with the tube, and attributed our speed and assurance pretty much to this improved tube.

Another is dulling the inside of the slant of our bleeding needles at least half way up from the point. This results in pushing the displaced skin to one side instead of cutting out a tiny, neat, round plug and ramming it into the lumen of the needle. It saves much time previously lost in climbing out of the manger to clear the needle and perhaps contaminate it.

J. H. WINTER

Brooklyn, Mich.

Veterinary Practice V

By E. T. BAKER
Moscow, Idaho

WITH the car and equipment in readiness, when the 'phone rings, a voice may shout:

"Say, Doc, that you? Can you come right out to th' Riley place?"

"How's it acting?" we query.

"Queerest thing I ever saw. She freshened yesterday an' was doin' fine, an' now she can't git up. Musta hurt her back."

"All right, Tim," we answer, "you pile some bedding around her, and throw a blanket over her, and I'll be right out."

Placing about 750cc of calcium gluconate solution in bottles in a pan of warm water, we slip into our sweater and coveralls and rubber shoes and, in a few minutes, are on the way with a fairly good idea of what to expect and are prepared for it.

Treatment is started on arrival without any delay, and the owner is gratified at such quick service. Mrs. Riley may come out and shake her head sadly.

"Ain't much chance, is there, Doc?" she queries.

"Well, she's mighty sick, but if she isn't too far gone, we may save her." Informing our clients that 99 out of a hundred cases of milk fever may recover is not in our vocabulary. We do not believe in scaring our clients, but when they think a patient is in a serious condition, it helps to get nursing directions observed scrupulously. Why change their minds and risk having the sick animal neglected after we leave?

The cow was covered and bedding piled around her

Not all cases are so simple. Here is an example:

"Can you come out to the Lang farm immediately?" a well modulated feminine voice asks over the 'phone.

"Yes, how is the animal acting?" we counter.

Now, Mrs. Lang happens to be an ex-school ma'am, raised in town, and timid about expressing herself on animal ailments.

"It's a cow," she answers.

"Has she freshened recently?" we ask.

"No, that's the trouble," she replies, evasively.

"Oh, you mean she's trying to have a calf," we interject.

"Yes," she faintly and finally tells us.

With that information so painfully gained over the 'phone, we change at home to our obstetrical suit; fill a gallon bottle with warm water, and take a bottle or two of gluconate off the top of the stove, for we always use that in calving cases. One never knows what to expect in these bovine "coming out parties," so it is better to be prepared for anything. The cow may be out in a pasture, so having warm water along will not only come in handy but save time also.

Bill Lang has a bunch of good Shorthorn cattle, and quite a time with a young heifer trying to give birth to her first calf is expected. She may even be wild from eclampsia, so it is the part of wisdom to have a good rope halter and lariat along.

Sure enough, Mrs. Lang meets us at the barn gate, and points out in a pasture where Bill's pickup is standing.

"I'll open this gate, and you can drive right down the fence," she adds pleasantly.

To make a long story, shorter, for we go into obstetrical details later, in about an hour the calf is delivered and we are on our way back home with a check. Being prepared for the call has saved us a lot of confusion and delay, and made it easier for all concerned.

Later, the 'phone rings again:

"Say Doc, I gotta sick hoss an' I know it's his water. What'll I give 'im?"

You recognize the voice as that of Link Rohm, one of the "tightest" farmers in the civilized Northwest. He gave his wife two-bits to spend on their honeymoon, 30 years' ago, and she has had none since. One is pretty sure his horse has impaction, and that he has given red liniment and rosin and niter and anything else at hand but, knowing Link's great weakness, one replies gently:

"Better give him some more red liniment, and if he isn't any better in an hour, let us know. There's been a lot of Chinese lettuce trouble lately," we add.

We know Link is deathly afraid of the lettuce for he has lost several good horses in the past few years from it, so we merely await developments. We do not offer to rush out, or otherwise high-pressure him into making

a call. It merely takes small but repeated doses of applied psychology in his case.

In about 20 minutes the 'phone rings again. It is Link:

"Say, Doc, mebbe you better come out right-away; that hoss ain't no better, an' I'm 'fraid he's gittin' wuss."

As we drive out the five miles we figure on how much currency for our expenses, services and spiritual aid Link should transfer. We finally decide on an elderly ten dollar bill as a just and equitable fee, if the case turns out, as we think it will, to be a stubborn case of impaction. We know any bill in Link's possession will be far past its middle age, as they remain in his custody for a long, long time.

Arriving at the Rohm ranch, Link rushes out to meet us, for he is greatly worried, as this happens to be his best horse. While the examination is in progress, he asks in an anxious voice?

"Is he gotta chanst, Doc?"

We remain silent with the same solemn countenance employed by a young undertaker conducting his first rich funeral. Our attitude has stricken terror into Link's ultra-microscopical soul.

We continue our examination and find the patient's entire digestive tract as quiet as a country church just before the collection plate is passed. There is a little bloat in the right flank, and we raise the animal's upper eyelids to show Link the congestion. A rectal examination reveals nothing new. It seldom does in these cases but one cannot afford to pass it up. Sometimes such an examination avoids an embarrassing blunder.

"I ain't lettim go too long, has I, Doc?" he quivers.

"Awful sick horse, Link," we mutter, "a gosh-awful sick animal," and it's not an exaggeration.

After a brief pause, we add:

"Only reason he's got a chance is that you are a good feeder, Link, and he's got a good constitution because he's been well kept."

Pride swells up in the small lymph node which may act as a heart in Link's gnarled body. We have touched a vital spot, and he feels kindly towards us for this remark, which he admits is true.

"Kin I get some warm water, Doc?" he asks eagerly, for now he wants to help.

"Yes," we answer, "and bring out a cake of soap." Now, we have plenty of soap in the car, both of the antiseptic and soft varieties, but it is like balm in Gilead for him to be called on for anything now. Many young practitioners make the mistake of not allowing the owner or by-standers to assist in this great crisis. Months afterwards Link will be telling his neighbors:

"Me an' Doc sure pulled old Ned out, when he was jist about dead. Doc knows almost as much about China lettuce as I do. You know my old Dad showed me how to handle them lettuce cases, an' he never lost a one. He allus used sheep manure tea an' sody."

But to get back to our call. We slipped the patient a couple capsules after dipping them in elixir of lactated pepsin, and Link was greatly impressed at the ease of administration. Next, we gave the patient a non-constipating antispasmodic, and a small clyster of soapy water and glycerin. We handed a bottle of liniment to Link and told him to rub it over the animal's kidneys.

"Thatta boy," grinned Link, "that'll make his water start a workin'."

We then mixed up a quart of medicine, and told Link to give one-fourth every two hours. This, Link would always regard as the turning point in the war.

"You know, Doc," he confided to me some time later, "I knowed he'd make it after I give 'im th' second dose. It jest took holt, an' pretty soon old Ned was lookin' 'roun' fer somethin' to eat."

As I drove back home with a 10-dollar bill to add to our little collection of rural souvenirs, I pondered over the art of actual practice as found in these great United States. I had given Link a 10-dollar value, but more important I had left Link satisfied with his investment and that is important, since if he were not satisfied the next time he has a sick animal he wouldn't call for help and as a consequence probably lose it.

Handling quarantine cases requires great diplomacy and, here again, practicing the Golden Rule will save one a lot of trouble.

Where pets are hit by cars and weeping women or children look to you for help, gentleness is a prime requisite.

Making each call is still, after making more than 40,000 calls, an adventure to me. It is a trip to an unknown land. I enjoy the scenery along the way and am thankful I live in such a beautiful land, and can live my life in my own manner, instead of being pushed around as the little men are in some lands, by dictators great and small.

The most disheartening thing about practice is that we are judged by the final result. If the patient is dying when we arrive, we are blamed for the death. However, if it is on the way to recovery, we are given great credit for saving a life. "There ain't no justice" in this, but it is the way of practice, and we might as well get used to it.

(To be continued)

Abstracts

Muted Mules

On General Wingate's first expedition into Burma the braying of mules and neighing of ponies often betrayed to the enemy the location of Allied troops. Even more serious was the constant anxiety engendered in the troops when small detachments were traversing the jungle and ever liable to discovery because of the braying of their animals.

When preparations were being made for the second Burmese expedition Brigadier C. M. Stewart[36] was consulted upon the possibility of eliminating the braying of mules. The conditions were exacting. The muting must be complete and permanent, the operation must not incapacitate the animals for more than a brief period, it must not reduce the ability of the animals to perform hard work in the forth-coming campaign and the mortality must be minimal since there was no surplus of animals. Moreover, the operations would have to be performed in the field, in considerable part in the jungle and with great speed.

Accordingly teams comprising a surgeon, an anesthetist and personnel for casting the animals were trained for the work. In July, 1943 the order came to mute the animals and preparations were made with all speed. The brigade was then in the depths of the jungle and the monsoon was at its height. The expedition was to move out soon and everyone concerned pressed for the utmost speed in getting the operations over.

"The conditions under which these operations on the 111th Brigade animals were done were at times indescribable. Animals were cast in a jungle clearing on large tarpaulins spread over a bed of grass. As long as the weather remained dry this was all right, but when the rain came down in torrents we had to cast the animals and drag or lift them under a hastily erected tarpaulin shelter with which our main concern was to prevent sufficient rain collecting on top to cause collapse of the overhead structure. When the rain was not too heavy, operations were done with waterproof capes or coats held over the operator."

The operation consisted in opening the larynx and total extirpation of the vocal cords. Intravenous, chloral hydrate anesthesia was employed. Chloroform was not used because it increased the hemorrhage and thus lengthened the operation. Local anesthesia, too, lengthened the operation because of the time required to anesthetize the vocal cords (painting with 10% solution of cocain) after the larynx was opened.

Untoward sequels were few. An occasional animal developed some voice after a few weeks as a result of failure to remove all of both cords and strip the ventricle. In a very few instances chrondritis developed as a result of accidental injury to the laryngeal cartilage. A few minor injuries occurred incidental to casting and early in the work a few cases of phlebitis as a result of a casting line crossing the neck and preventing a free flow of the chloral hydrate solution. Except during the monsoon season maggot infestation of the wounds was prevented by an iodoform dressing. During the heavy rains a few cases of infestation occurred but were mainly prevented by daily spraying with antifly ointment.

In a total of 5,563 operations there were 43 casualties (0.77%). Nearly all of these occurred in operations performed early in the project and in the jungle at the height of the monsoon season.

Up to 30 operations a day were performed by an operating team.

[36]Stewart, Brigadier C. M. The muting of animals for General Wingate's force operating behind the Japanese lines in Burma. *J. Royal Army. V. C.* 17:3, pp. 87-90. 1946.

* * * *

Researches on Swine Paralysis

Differing opinions of various research workers as to the etiology of paralysis led the author[39] to undertake studies of experimentally induced cases.

The plan of procedure was to induce the disease under the usual conditions and then search for one or more factors that would prevent the disease.

Paraplegia

Forty-six animals were included in the experiment. They were fed various diets in which proteins, vitamins or green food were lacking. The results "showed conclusively that nutritional swine paralysis is due to (1) lack

[39]Bueno, P. Pesquizas sobre a paralisia dos suinos. Arquivos do Instituto Biologico 16:1, pp. 1-13, 1945. Obtainable as a separate from Superintendente do Instituto Biologico, P. O. Box 119-A, Sao Paulo, Brazil.

of green food in the diet or (2) an inadequate amount of protein in the diet." The symptoms of paraplegia from the two causes were slightly different.

By withholding all green feed from swine the author was able to induce paraplegia in swine fed upon a diet well balanced in carbohydrates, proteins and vitamins. He was not able to reverse the experiment and produce paraplegia by withholding protein from animals on green feed since all green feed at his disposal contained protein.

Vaccine Apparently Successful in Pneumoencephalitis in Fowl

Acting on the principle employed by Green in developing a successful vaccine for canine distemper Komarov and Goldsmit[33] of Palestine attempted to prepare a vaccine against pneumoencephalitis (Newcastle disease) of chickens by serial passage of the virus through ducklings which are known to be more resistant to the disease than chickens, but still susceptible to intracerebral inoculation.

The virus was first fixed by nine intracerebral passages in pigeons. It was then 100% mortal to chickens by intracerebral inoculation.

Virus obtained from the brain of ducklings after the 10th to 14th passage failed to produce the disease in chickens upon intracerebral inoculation. The birds remained healthy when inoculated intracerebrally 18 days later with virus that killed 100% of the control birds.

Blood Transfusion in Cattle

Johnston[35] finding little in veterinary literature on the subject of blood transfusion collected samples of sera from 50 dairy and other cattle and tested them against blood from three times as many bovine animals for agglutination between the cells and the serum. Finding none he concluded that typing of bovine blood before transfusion is unnecessary.

As a further precaution transfusion was carried out on five emaciated cows due to be slaughtered. Each animal was given 2000cc of blood. One of these cows received the same amount daily for seven days; a different donor being used each time. No adverse reaction was observed ante mortem or post mortem.

The author has employed blood transfusion repeatedly since and finds it a satisfactory treatment for postpartum hemoglobinuria and depletion due to hemorrhage.

Encephalomyelitis Treated by Anesthesia

It seemed to the authors[32] a logical step from the standard treatment of convulsive conditions with sedatives and narcotics to the use of anesthetic in the treatment of diseases due to neurotropic viruses.

In an experiment three groups of Swiss mice were inoculated intracerebrally with western type equine encephalomyelitis virus. Group I served as controls; Group II received three four-hour periods of ether anesthesia during the first 36-hours after inoculation and Group III received two four-hour periods of anesthesia beginning at the time the first symptoms of encephalomyelitis had developed.

The treatment by ether anesthesia was regarded as effective. Of the control group 92.4% died; of Group II 58% and of Group III 60% succumbed.

It is postulated that a different anesthetic might be even more effective.

The Nature and Treatment of Shock

The author[34] defines shock as "a state of actual or impending peripheral circulatory failure due to a reduction of the effective blood-volume which is not primarily cardiac in origin." It is possible to distinguish according to the mechanism of production the three following possible types of shock: neurogenic (primary shock, nervous shock, syncope) which is a state of widespread vasodilatation without primary capillary injury; vasogenic (histamine shock, toxic shock) which is a result of direct injury to capillary walls; and hematogenic (traumatic shock, secondary shock, surgical shock, oligaemic shock) which is the result of a primary loss of fluid from the circulation.

Dunphy discusses briefly each of the above types and then deals with hemoconcentration, the pulse and blood pressure in shock, capillary injury, the role of the adrenals, the theory of toxemia and the diagnosis of shock. The principles of treatment in hematogenic shock consist in the prompt replacement of blood with blood and of plasma with plasma. There is no adequate substitute for blood or plasma. Supplying heat in the form of numerous hot water bottles, blankets and "shock cradles" is now generally agreed to be detrimental because such measures increase the

[33]Komarov, A., and Goldsmit, L. Preliminary observation on the modification of a strain of Newcastle disease virus by intracerebral passage through ducklings. *Vet. J.* 102:7, pp. 212-218. 1946.

[35]Johnston, R. W. M.R.C.V.S. Blood transfusion in the bovine. *Vet. Rec.* 58:25, pp. 271-272. 1946.

[32]Sulkin, S. Edward, Andres, Goth and Zarafonetis, Christine. Influence of anesthesia on experimental western equine encephalomyelitis. *Science* 104:2690, pp. 53-54. 1946.

[34]Dunphy, J. E. Shock, consideration of its nature and treatment. *Brit. J. Surg.* 32, pp. 66-74. 1944. Abs. in *Vet. Bul.* 16, p. 108. 1946.

metabolism of peripheral tissues just when available blood and oxygen are needed elsewhere. It is sufficient to try to maintain body warmth by prevention of exposure rather than by application of heat.

No specific measures are as yet known for uncomplicated neurogenic or vasogenic shock. Saline may be useful to restore blood volume in neurogenic shock; the effect is temporary and the saline escapes when the vascular tone returns to normal. Saline should never be given in shock associated with capillary or tissue injury, whether general or local.

Histological Diagnosis of Rabies

Histological examination of the ganglion nodosum of the vagus nerve by rapid staining of frozen sections with cresyl violet is considered to have several advantages over the

Rabies

examination for Negri bodies in Ammon's horn and by other histological methods.

In over half of 52 cases reported by the author[32] no Negri bodies could be found in Ammon's horn by Lenty's method, whereas characteristic changes of the nerve cells, with marked neuronophagic proliferation of the capsular cells of the ganglion nodosum were seen in all of the 52 cases. Although these changes are not specific to rabies they are not found in the same form in other diseases which have to be considered in the differential diagnosis. The ganglion nodosum is easily accessible even in the beheaded animal and is relatively resistant to putrefaction. The method permits of diagnosis in less than one hour.

[32]Herzog, E. Histologic diagnosis of rabies. *Arch. Pat.*, 39, pp. 279-280. 1945. Abst. in *Vet. Bul.* 16:4, p. 99. 1946.

Transplantation of Ovaries in the Bitch

Whitney[33] reports two instances of the successful transplantation of the ovaries of aged bloodhounds into young foxhounds.

For a number of years unsuccessful attempts have been made to transplant the ovaries of dogs of different breed. The author attributes success in this instance to the recipients being in heat when the transfers were made. Estrus was subdued for a few days after the transfer then recurred in full intensity for the normal period. Two succeeding periods of estrus occurred on the cycle of the donors (bloodhounds) which was different from that formerly exhibited by the recipients. The author suggests that this may indicate that the initiation of estrus is a function of the ovary rather than of the pituitary.

The transfer was accomplished by incising the capsule and removing the ovary at the hilus. The donor's ovary was secured in position in the capsule of the recipient with several fine catgut sutures and the capsule closed.

One of the bitches was killed 168 days after the operation. The ovaries appeared normal and on histological examination showed corpora lutea and innumerable follicles.

Useful Bulletins, Circulars, Etc.

Livestock Poisoning by Crotalaria.—Cir. 36, Louisiana Agr. Exp. Sta. University Station, Baton Rouge.

Better Milking. Methods for saving time, increasing production, and reducing udder injury. Special Cir., Univ. of Wisconsin, Madison.

Weeds Poisonous to Livestock.—Many weeds are discussed as to toxicity, symptoms produced and treatment. 40 illustrations. Minnesota Agr. Sta. University Farm, St. Paul 8.

Bacilliary Hemoglobinuria of Cattle and Sheep.—A 48-page discussion of a study of red water disease extending over a period of more than 30 years. Tech. Bul. No. 173, Univ. of Nevada Agr. Exp. Sta., Reno.

Report of the Chief of the Bureau of Dairy Industry, Agricultural Research Administration, 1945.—Order from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Price 10 cents.

Selecting a Dairy Herd Sire.—Includes a discussion of factors to use in sire selection, the evaluation of a pedigree, significance of a "proved" sire, terms and abbreviations used by breed associations, and where information concerning the sire may be found. A list of names and addresses of national breed associations is included. Ext. Bul. 276 Michigan State College, East Lansing.

[33]Whitney, Leon F. The successful transfer of ovaries between dogs of different breed. *Sci.* 103:2682, pp. 654-655. 1946.

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An insect repellent, developed by the Naval Medical Research Institute, which can be used as a spray on clothes or animals, will keep flies, mosquitoes and other pests away for 36 hours and it will kill insects that come in contact with it as with DDT. Repellent 448, as the new chemical is called, was developed for jungle fighting but is now being manufactured for civilian use. This repellent is nontoxic and can be sprayed upon cows before they go to pasture. When sprayed in house or barn it not only kills insect pests but keeps others out for 10 days to two weeks.

■

To Control Foot-and-Mouth Disease

New regulations of the Florida State Livestock Sanitary Board effective for six months beginning July 10th prohibits the entrance into Florida of Brahman bulls imported from any foreign country to the North American continent. Brahman bulls, cows and heifers transported into Florida from Texas must have certification on official interstate health certificate that they are native Texas cattle and are free from foot-and-mouth disease, scabies, cattle fever ticks and have had no contact with foreign cattle brought into Texas.

■

"It Can't Be Pregnancy Disease"

Sheep practice in this area has been increasing very rapidly for the past couple of years. Last spring I had a number of cases of pregnancy disease—on some farms this condition was their No. 1 problem.

One of my clients lost three ewes that, in each case, I diagnosed pregnancy disease as soon as I heard the history of pregnancy, near parturition with roughage as their only feed. I advised the owner to feed oats and corn along with the hay and, after following the advice, he lost no more ewes.

A few weeks later, I received a call from this farmer's wife. "Doctor," she said, "we have another sick sheep. It is down like the others and it can't be pregnancy disease." (Her tone intimated that I was probably wrong in my diagnosis of the other sheep.) "Why not," I asked. "Because it's a buck," she replied with an evident note of triumph in her voice. I felt as if a bolt of lightning hit me, as I was certain the others had pregnancy disease, but now the buck was sick. I told her I would be right out and I left immediately.

The buck was lying on his side, all four legs extended. He looked like a saw horse on its side. I touched him and he stiffened up. I gave a sigh of relief, looked at Mrs. X and asked her if the buck had been inquired recently. She said she didn't know, but he had been limping for the past week. Further examination revealed a healing wound on one fetlock.

"Mrs. X" I said, "the other sheep died of pregnancy disease. You are right about this buck. He hasn't pregnancy disease, but he will die of lockjaw in a few hours."—*G. Tableman.*

In 1945 there were 21 billion pounds more milk produced in the United States than in 1935.

■

Junior Show Animals Exempt from Ceilings

Hogs that will be exhibited at the annual Chicago Junior Market Hog Show and Sale, to be held October 18, and all animals exhibited by junior classes at the International Livestock Show, November 30 to December 6, will be exempt from ceilings according to notification of the management of the shows by OPA officials.

■

Mastitis Problem Solved

This morning a client who has had more than his share of mastitis trouble, came into the office with a letter, a copy of which is enclosed.

This letter was written on the stationery of the furniture store where the "expert" is employed. He peddles minerals of an evening.

I am sure that those of us who still consider mastitis a serious problem will be relieved to learn that at last someone understands its prevention and control.

DANIEL P. EHLERS

Butler, Pa.

Dear Mr. Byers:

I've been studying over what you've told me of your mastitis trouble. I've written to the State Laboratories and I've read every book I could get on the subject of Mastitis and this is what I've found.

In the first place Mastitis is not hereditary in cattle and is not in the blood stream. It can be controlled by the proper sanitation and the proper feeding of a balanced ration with the right amount of a good mineral yeast. The wheat germ cake that H's mineral yeast carries will help to do the job much better.

This disease is carried by the house fly which will settle on the cow's teats around the vent where the milk comes through and therefore spread the Mastitis germ there.

As for the use of Penicillin vaccination, it has been successful in most cases, but the Mastitis in your cows is more a vitamin and mineral deficiency and can be controlled by feeding a good mineral.

The hardening in the upper part of the udder is because the calcium and phosphorus does not have the right spread. There should be a spread of about 9 to 11% in there as the calcium concretes the muscles and the phosphorus will relax. Therefore if this is not properly balanced this hardening will appear sometimes even before the heifer freshens.

I think that by feeding mineral yeast regularly you will notice a change in a short time. There is enough vitamin A in the wheat germ cake in H's yeast mineral to take care of most cases of this kind, but if the mineral does not do this you can try the addition of Carotene in a very small amount in the feed.

I am in hopes that this information will be of help to you. I'd like to see you get rid of Mastitis completely.

Please keep in touch with me. If I find anything more, I'll let you know.

Sincerely yours,
J. F. L.